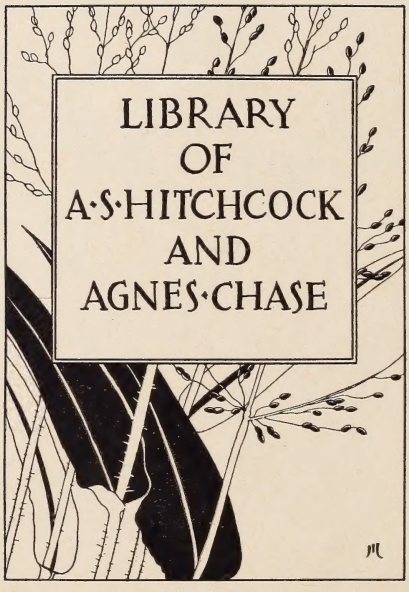
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GRASSES OF SCOTLAND.

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THE

GRASSES OF SCOTLAND.

BY

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ILLUSTRATED BY FIGURES
DRAWN AND ENGRAVED BY THE AUTHOR.

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——————— the bare earth
Brought forth the tender grass, whose verdure clad
Her universal face with pleasant green.

MILTON.

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PREFACE.

The work here offered to the public on the Grasses of Scotland is designed to afford to the student of this difficult department of Botany, assistance of a more available kind than the treatises in general use attempt to supply. In most other respects it proceeds on the established plan of works of the same description.

Much attention has been bestowed on the definitions both of genera and species. In some instances new genera have been framed, and a few new species have been added, while the specific characters are determined throughout with the greatest possible care.

The authorities for the species adopted, both British and foreign, have been invariably cited. But no character has been taken on trust, or has been admitted without careful examination to ascertain its presence in every instance. And in the cases, (which are not few,) where new characters have been substituted, their constancy has been tested by the examination of at least one hundred specimens of each species, obtained from various localities.

In the description of each grass, the state of every individual part has been carefully set down, so that, on the comparison of any two descriptions, the several differences between the species inspected will be at once apparent. And in addition to this assistance, an endeavour has been made to point out the most prominent diagnostic marks between those species which are most liable to be confounded.

Of each species a figure has been given. In every instance these figures have been drawn and engraved by the author; and though

such attempts lose the advantage of being done in an artist-like manner, it perhaps outweighs this drawback in a work for practical use, that the several steps of the labour are performed by one familiar with the minute parts of the objects copied. Nearly the whole of the figures are of natural size, and have been obtained from recent specimens, while in no instance has any use been made of plates already published. Of the parts of the flower, magnified views are likewise given. With regard to the varieties occurring under certain species, pains have been taken to name and describe shortly all those that seem to deserve such notice; and of each of these a figure has been given.

Under the head of habitat the several countries in which each species is known to be produced are expressly stated. The range of the altitude of the places of growth is specified as accurately as possible. The time when the seed is matured (which it is often useful to know), as well as the time of flowering, is everywhere indicated. And notices are introduced of the agricultural and other properties of such species as are of any value.

My original purpose was to embrace in this work all the Grasses of the United Kingdom, but the want of recent specimens of the Grasses peculiar to England and to Ireland, made it necessary that, for the present, I should limit my plan. I propose, however, as soon as I have gained the proper opportunities, to publish a similar account of those additional species.

I have given a list of all the Grasses found within fifteen miles of Edinburgh; and in this list will be found a few beyond those in Greville's Flora Edinensis or Woodforde's Catalogue.

I have attempted an arrangement of the species of the Grasses of Scotland on the dichotomous plan, the mere inspection of which will, I think, sufficiently explain the use that may be made of it.

The number of species and varieties described and delineated in this work is altogether one hundred and thirty-three,—and, with the exceptions referred to in the following table, the arrangement and synonymes followed by Sir William Hooker in his British Flora have been adopted.

Agrostis Spica Venti	changed to	Anemagrostis Spica Venti.
Melica cærulea		Molinia cærulea.
Triticum loliaceum		Poa loliacea.
Festuca calamaria		Poa sylvatica.
Festuca loliacea		Bucetum loliaceum.
Festuca pratensis		Bucetum pratense.
Festuca elatior		Bucetum elatius.
Bromus giganteus		Bucetum giganteum.
Avena pratensis		Trisetum pratense.
Avena alpina		Trisetum pratense.
Avena planiculmis		Trisetum pratense.
Avena pubescens		Trisetum pubescens.
Avena flavescens		Trisetem flavescens.
Festuca Myurus		Festuca bromoides.
Festuca rubra		Festuca duriuscula.
Brachypodium sylvaticum		Triticum sylvaticum.

I should perhaps add before concluding, that my pretensions to attempt a work in this difficult department of Botany rest, among other grounds, on my possessing an extensive collection of Grasses made by myself, not only throughout this island, but also in the West Indies and the southern parts of North America, as well as, on an unlimited freedom of access to the Herbarium of the Royal Botanical Society of Edinburgh, and to the rich collections of Professor Graham and of Dr Greville of Edinburgh, and of Professor Balfour of Glasgow.

Edinburgh,
September 26th 1842.

GRASSES

FOUND WITHIN FIFTEEN MILES OF EDINBURGH, THEIR PRINCIPAL LOCALITIES AND TIME OF FLOWERING.

Nardus stricta, frequent on Braid and Pentland Hills; North Queensferry; Dalmahoy; sides of Ravelrig Bog. Commences to flower in the first week of July. (Plate II.)

Rottbollia incurvata, said to have been found on Musselburgh Links. Flowers in the third week of July. (Plate II.)

—— —— *filiformis*, frequent in salt marshes near Aberlady. (Plate III.)

Alopecurus agrestis, in fields near Tranent. Flowers in the first week of July. (Plate III.)

Alopecurus pratensis, found in almost every meadow; Lochend; Duddingston Loch; King's Park. Commences to flower in the last week of April. (Plate IV.)

Alopecurus geniculatus, frequent on the sides of ponds and ditches. Duddingston Loch; Lochend; Braid Hill marshes; ditches in the King's Park, &c. Flowers in the first week of June. (Plate V.)

Phleum pratense, frequent in meadows; Lochend; King's Park; fields under the Pentland Hills; Liberton, &c. Flowers in the third week of June. (Plate VI.)

Phleum arenarium, sea-shore near Burntisland; near Prestonpans; between Pettycur and Kirkaldy; west of North Queensferry. Flowers in the second week of July. (Plate VII.)

Anthoxanthum odoratum, common in Roslin wood; Caroline Park; Braid Hill; Auchindinny woods, &c. &c. Flowers in the second week in April. (Plate VIII.)

Ammophila arundinacea, sea-shore between Cramond and Queensferry; near Caroline Park, between Burntisland and Pettycur; between Caroline Park and Cramond. Flowers in the second week of July. (Plate VIII.)

Phalaris canariensis, occasionally met with in waste places, but in no fixed situation. Flowers in the first of July. (Plate IX.)

Phalaris arundinacea, common on the margins of Duddingston Loch and Lochend, &c. &c. Flowers in the second week of July. (Plate IX.)

Hordeum murinum, under walls in King's Park; Salisbury Craigs; Calton Hill, very common. Flowers in the last week of June. (Plate X.)

Hordeum pratense, occasionally in the meadow at the foot of Salisbury Craigs; east point of Salisbury Craigs, very rare; Coates, the west side of Edinburgh. Flowers in the first week of July. (Plate XI.)

Agrostis vulgaris, King's Park; Duddingston Loch; Roslin Wood; Queensferry, &c. &c. very common. Commences to flower in the first week of July. (Plate XII.)

—— —— *pumila*, North Queensferry; Pentland Hills; Blackford and Braid Hills; Bruntsfield Links; Dalmahoy. Commences to flower in the first week of July. (Plate XII.)

—— —— *aristata*, Roslin wood; North Queensferry; Pentland Hills. Commences to flower in the first week of July. (Plate XIII.)

Agrostis alba, frequent in marshy places; Duddingston Loch; Lochend; Braid Hill; foot of the Pentland Hills. Flowers in the third week of July. (Plate XIII.)

—— —— *stolonifera*, frequent in ditches; Duddingston Loch; Lochend; Queensferry, &c. &c. Flowers in the third week of July. (Plate XIV.)

—— —— *palustris*, in ditches the west side of Duddingston Loch; Lochend, &c. &c. Flowers in the third week of July. (Plate XIV.)

Agrostis canina, King's Park; Pentland Hills; Braid Hill; Roslin wood, &c. &c. Flowers in the third week of July. (Plate XV.)

Anemagrostis Spica venti, said to have been found in Roslin wood. Flowers in the second week of July. (Plate XVII.)

Milium effusum, Roslin and Newbattle woods, frequent. Flowers in the second week of June. (Plate XVII.)

Melica uniflora, Roslin, Colinton, and Newbattle woods, frequent. Flowers in the second week of June. (Plate XVIII.)

Airochloa cristata, Arthur's Seat; summit of Corstorphine hill; North Queensferry; Dalmeny Park, near the sea. Flowers in the third week of June. (Plate XIX.)

Melica nutans, said to be found in Roslin wood. Flowers in the last week of May. (Plate XVIII.)

Molinia cærulea, Pentland hills and Ravelrig Toll moss; by the path side in Roslin wood, near Hawthornden, plentiful. Flowers in the third week of July. (Plate XX.)

Catabrosa aquatica, ditch on the west side of Lochend, plentiful; Duddingston loch; in a stream near Gosford; near Portobello, &c. Flowers in the second week of July. (Plate XX.)

Holcus lanatus, King's Park; Braid Hill; Queensferry, &c. &c., very common. Flowers in the first week of July. (Plate XXI.)

Holcus mollis, Roslin and Auchindinny woods; by the side of a stream between Lasswade and Mavis Bank; in a lane leading to Colinton wood, &c. &c. Flowers in the second week of July. (Plate XXI.)

Aira cæspitosa, frequent in Roslin and Auchindinny woods; Pentland Hills; Braid Hill marshes; Hunter's Bog, &c. &c. Flowers in the third week of July. (Plate XXIII.)

Aira flexuosa, common in Roslin wood; Arthur's Seat; Braid, Blackford, and Pentland hills, &c. Flowers in the first week of July. (Plate XXIV.)

Aira caryophyllea, occasionally on the Dalkeith Railway; debris on the south-west side of Salisbury Craigs; Arthur's Seat; Blackford Hill, &c. Flowers in the third week of June. (Plate XXIV.)

Aira præcox, occasionally on Braid Hill; south-west side of Salisbury Craigs; Arthur's Seat; on a wall top about a mile from Ravelrig Toll, &c. Flowers in the last week of May. (Plate XXV.)

Arrhenatherum avenaceum, frequent on the Dalkeith Railway; Samson's Ribs; Salisbury Craigs; Blackford Hill; Roslin wood, &c. &c. Flowers in the third week of June. (Plate XXV.)

—— —— *bulbosum*, frequent on the Dalkeith Railway; Caro-

line Park; Blackford Hill; Roslin wood; Queensferry, &c. &c. Flowers in the third week of June. (Plate XXVI.)

Avena strigosa, found occasionally in the neighbourhood; Meadowbank, &c. Flowers in the first week of July. (Plate XXVI.)

Cynosurus cristatus, very common in pastures; south side of Duddingston Loch; King's Park, &c. &c. Flowers in the first week of July. (Plate XXVIII.)

Dactylis glomerata, very common; King's Park; Salisbury Craigs; Blackford Hill; Liberton, &c. &c. Flowers in the second week of June. (Plate XXIX)

Arundo phragmites, Duddingston Loch and Lochend, common. Flowers in the second week of August. (Plate XXIX.)

Triodia decumbens, frequent on the Pentland Hills; North Queensferry; Braid Hill, &c. &c. Flowers about the middle of July. (Plate XXX.)

Briza media, Roslin woods; Pentland Hills; Hunter's Bog; Blackford and Braid Hills, &c. &c. Flowers in the last week of June. (Plate XXX.)

Poa pratensis, very common in almost every pasture, road-sides, &c. &c. Flowers in the first week of June. (Plate XXXI.)

—— —— *planiculmis,* frequent by road-sides at North Queensferry; near Dalkeith; Portobello; lanes near Duddingston, &c. &c. Flowers in the first week of July. (Plate XXXII.)

—— —— *umbrosa,* frequent in shady places; Roslin wood; Colinton wood; Dalmeny Park, &c. &c. Flowers in the first week of July. (Plate XXXII.)

—— —— *arida,* common in dry exposed situations; King's Park; Blackford and Braid Hills; Queensferry, &c. &c. Flowers in the last week of June. (Plate XXXIII.)

—— —— *retroflexa,* frequent in pastures in shady situations; lanes near Duddingston; Dalmeny Park; Caroline Park, &c. &c. Flowers in the first week of July. (Plate XXXIII.)

—— —— *muralis,* common on walls in shady places; near Roslin; Morningside; Colinton, &c. &c. Flowers in the first week of July. (Plate XXXIV.)

—— —— *arenaria,* frequent by the sea-side under Dalmeny Park,

growing with *Ammophila arundinacea.* Flowers in the second week of June. (Plate XXXIV.)

Poa trivialis, very common in damp woods and marshy places; Duddingston Loch; Lochend; King's Park, &c. &c. Flowers in the third week of June. (Plate XXV.)

—— —— *parviflora,* frequent in Colinton wood; Roslin; Arniston woods, and damp shady places. Flowers in the third week of June. (Plate XXXV.)

Poa nemoralis, not common, found occasionally in Arniston woods and in Roslin wood on the shady rocks near the river. Flowers in the third week of June. (Plate XXXVI.)

—— —— *angustifolia,* occasionally in shady pastures; frequent at Coates, the west side of Edinburgh. Flowers in the first week of July. (Plate XXXVI.)

Poa compressa, frequent on walls about Edinburgh, especially in St Leonard's Lane; debris of Salisbury Craigs; Samson's ribs, &c. Flowers in the second week of July. (Plate XXXVII.)

Poa polynoda, frequent on the Dalkeith Railway, about two miles from Edinburgh; near Musselburgh; North Queensferry. Flowers in the first week of July. (Plate XXXIX.)

Poa annua, very common in every pasture and road-sides. Flowers throughout the whole of the spring and summer. (Plate XL.)

—— —— *serica,* frequent by the sides of Duddingston Loch; Lochend, &c. Flowers in April and May. (Plate XLI.)

Poa distans, not common; about two miles to the north of North Queensferry, in a marsh; a small patch at South Queensferry immediately opposite the door of the hotel, over the wall leading to the beach. Flowers in the first week of July. (Plate XLI.)

Poa maritima, frequent in many places along the shore; under Dalmeny Park; in a marsh about two miles to the north of North Queensferry. Flowers in the first week of July. (Plate XLII.)

Poa rigida, frequent on Salisbury Craigs; rocky places near Samson's Ribs; Blackford Hill; on walls about Burntisland. Flowers in the second week of July. (Plate XLIII.)

Poa loliacea, occasionally between Granton and Caroline Park; near Burntisland and Pettycur along the beach. Flowers in the second week of July. (Plate XLIII.)

Poa sylvatica, frequent in Roslin wood, on the bank near the river. Flowers in the second week of July. (Plate XLIV.)

Poa aquatica, plentiful on the banks of the Water of Leith, about a quarter of a mile below Canonmills Bridge. Flowers in the second week of July. (Plate XLIV.)

Poa fluitans, frequent on the margins of Duddingston loch; Lochend; King's Park; Braid Hill marshes; Arniston woods, &c. Flowers in the third week of June. (Plate XLV.)

Bucetum loliaceum, frequent in moist rich meadows; margins of Duddingston Loch; Hunter's Bog; meadows at the foot of Salisbury Craigs, &c. Flowers in the second week of July. (Plate XLV.)

Bucetum pratense, frequent in meadows; Hunter's Bog; sides of Duddingston Loch; Braid Hill marshes, &c. Flowers in the last week of June. (Plate XLVI.)

Bucetum elatius, frequent in moist woods and by sides of streams; Colinton, Arniston, and Roslin woods; Duddingston Loch; Caroline Park; North Queensferry, &c. Flowers in the first week of July. (Plate XLVI.)

—— —— *variegatum*, Colinton; Liberton; Caroline Park, &c. Flowers in the first week of July. (Plate XLVII.)

Bucetum giganteum, frequent in Roslin, Colinton, and Arniston woods. Flowers in the third week of July. (Plate XLVII.)

Bromus mollis, frequent on Salisbury Craigs; Samson's Ribs; Duddingston; Dalkeith Railway, &c. Flowers in the last week of May. (Plate XLVIII.)

Bromus racemosus, Salisbury Craigs; Dalkeith Railway; Caroline Park, Queensferry, &c. Flowers in the first week of June. (Plate XLVIII.)

Bromus secalinus, Dalkeith Railway; Newhaven; Granton; Caroline Park, &c. Flowers in the first week of June; Dalmeny Park. (Plate XLIX.)

Bromus arvensis, frequent near Duddingston; Dalkeith Railway; Granton; North Queensferry, &c. Flowers in the second week of June. (Plate XLIX.)

Bromus sterilis, common in King's Park; Duddingston; Newhaven, &c. &c. Flowers in the third week of June. (Plate L.)

Bromus diandrus, occasionally found in the neighbourhood; near the Grange Toll, but rare. Flowers in the third week of June. (Plate L.)

Bromus erectus, below Salisbury Craigs; near Pettycur, rare. Flowers in the third week of July. (Plate LI.)

Bromus asper, frequent in Roslin, Colinton and Arniston woods. Flowers in the third week of July. (Plate LI.)

Trisetum pratense, common on Salisbury Craigs; Samson's Ribs; Dalmeny Park; Caroline Park; North Queensferry, &c. Flowers in the first week of June. (Plate LII.)

—— —— *longifolium*, frequent in Caroline Park. Flowers in the second week of June. (Plate LII.)

—— —— *latifolium*, Salisbury Craigs; Samson's Ribs. Flowers in the second week of June. (Plate LIII.)

Trisetum pubescens, Salisbury Craigs; Arthur's Seat; North Queensferry, frequent. Flowers in the second week of June. (Plate LIII.)

Trisetum flavescens, very common in dry pastures; King's Park; Salisbury Craigs; Braid, Blackford, and Pentland Hills. Flowers in the second week of July. (Plate LIV.)

Festuca bromoides, frequent on the Dalkeith Railway; on the banks of Liberton burn; on an old wall by the the road side, about half a mile west of Slateford; on an old wall on the Queensferry road, about one mile from the Dean Bridge. Flowers in the second week of June. (Plate LIV.)

—— —— *nana*, on tops of old walls in dry exposed situations; common at North Queensferry. Flowers in the second week of June. (Plate LV.)

Festuca ovina, frequent on Arthur's Seat; Pentland Hills, &c. Flowers in the second week of June. (Plate LVI.)

—— —— *hirsuta*, frequent on Arthur's Seat; North Queensferry, &c. Flowers in the second week of June.

—— —— *vivipara*, occasionally on Arthur's Seat and Pentland Hills. Flowers in the third week of June. (Plate LVI.)

—— —— *angustifolia*, Dalmahoy and Pentland Hills; North Queensferry, &c. Flowers in the second week of June. (Plate LVII.)

Festuca duriuscula, frequent on Arthur's Seat; Salisbury Craigs; Dalkeith Railway; Pentland Hills, &c. &c. Flowers in the second week of June. (Plate LVIII.)

—— —— *filiformis,* frequent in Roslin, Arniston, and Colinton woods; in shady lanes near Duddingston, &c. Flowers in the second week of June. (Plate LIX.)

—— —— *arenaria,* common on the sea-shore at Musselburgh; Granton; Caroline Park, &c. Flowers in the second week of June. (Plate LIX.)

—— —— *rubra,* common on the shores of the Forth. Flowers in the second week of June. (Plate LX.)

Triticum sylvaticum, frequent in Colinton and Roslin woods. Flowers in the first week of July. (Plate LXI.)

Triticum caninum, frequent in Colinton and Roslin woods. Flowers in the first week of July. (Plate LXII.)

Triticum repens, very common on the borders of fields near Duddingston; foot of Salisbury Craigs; Portobello, &c. Flowers in the first week of July. (Plate LXII.)

—— —— *aristatum,* frequent in waste places, especially near the sea; Portobello; Newhaven; Granton, &c. Flowers in the first week of July. (Plate LXIII.)

Triticum junceum, frequent on the shore at Caroline Park; Dalmeny Park; Musselburgh Links, &c. Flowers in the first week of July. (Plate LXIII.)

Lolium perenne, common in every pasture in the neighbourhood. Flowers in the second week of June. (Plate LXV.)

—— —— *Italicum,* fields near Dalkeith; Duddingston; Newhaven, &c. Flowers in the second week of June. (Plate LXV.)

DR PARNELL'S ANALYTICAL ARRANGEMENT OF THE SPECIES.

Genera.		*Species.*	*Plate.*
NARDUS		*Nardus stricta.*	2
ROTTBÖLLIA		*Rottbollia incurvata*	2
ALOPECURUS.	Stem rough to the touch	*Alopecurus agrestis.*	3
	Stem smooth	1.	
1.	Upper leaf much shorter than its sheath	2.	
	Upper leaf about equal in length to its sheath	3.	
2.	Awn projecting more than half its length beyond the floret	*Alopecurus alpinus.*	4
	Awn (when present) projecting not more than one-third beyond the floret	*Alopecurus pratensis.*	4
3.	Awn projecting about half its length beyond the floret	*Alopecurus geniculatus.*	4 5
	Awn not projecting beyond the floret	*Alopecurus fulvus.*	5
PHLEUM.	Glumes awned	1.	
	Glumes acute, not awned	2.	
1.	Awn not half the length of the glume	*Phleum pratense.*	6
	Awn more than half the length of the glume	*Phleum alpinum.*	6
2.	Floret not half the length of the calyx	*Phleum arenarium.*	7
	Floret more than half the length of the calyx	*Phleum Michelii.*	7
ANTHOXANTHUM		*Anthoxanthum odoratum.*	8
AMMOPHILA		*Ammophila arundinacea.*	8
PHALARIS.	Base of floret with two membranous valves	*Phalaris canariensis.*	9
	Base of floret with two hairy valves	*Phalaris arundinacea.*	9
HORDEUM.	Glumes of the middle spikelet fringed	*Hordeum murinum.*	10
	Glumes not fringed	1.	

Genera.		*Species.*	*Plate.*
1.	Inner glume of lateral spikelet very much dilated on one side	*Hordeum maritimum.*	10
	Glumes not dilated	*Hordeum pratense.*	11
Polypogon		*Polypogon monspeliensis.*	11
Agrostis.	Ligule of the upper sheath very short	*Agrostis vulgaris.*	12
	Ligule of the upper sheath long	1.	
1.	Floret of two paleæ. Sheaths roughish	*Agrostis alba.*	13
	Floret of one palea. Sheaths smooth	*Agrostis canina.*	15
Calamagrostis.	Hairs shorter than the floret	*Calamagrostis stricta.*	16
	Hairs longer than the floret	*Calamagrostis Epigejos.*	16
Anemagrostis		*Anemagrostis Spica venti.*	17
Milium		*Milium effusum.*	17
Melica.	Calyx containing one floret with a rudiment of a second	*Melica uniflora.*	18
	Calyx containing two florets with a rudiment of a third	*Melica nutans.*	18
Airochloa		*Airochloa cristata.*	19
Molinia.	Outer palea five-ribbed	*Molinia depauperata.*	19
	Outer palea three-ribbed	*Molinia cærulea.*	20
Catabrosa		*Catabrosa aquatica.*	20
Holcus.	Awn of the floret smooth	*Holcus lanatus.*	21
	Awn of the floret rough	*Holcus mollis.*	21
Aira.	Awns not protruding beyond the florets	1.	
	Awns protruding considerably beyond the florets	2.	
1.	Awn arising from a little above the base of the palea	*Aira cæspitosa.*	23
	Awn arising from a little above the centre of the outer palea	*Aira alpina.*	23
2.	Sheath of leaf rough from above downwards	*Aira flexuosa.*	24
	Sheath of leaf rough from below upwards	3.	
3.	Panicle spreading	*Aira caryophyllea.*	24
	Panicle close	*Aira præcox.*	25
Arrhenatherum		*Arrhenatherum avenaceum.*	25

Genera.		*Species.*	*Plate.*
Avena.	Florets with two long bristles at the summit	*Avena strigosa.*	26
	Florets without bristles at the summit	*Avena fatua.*	27
Sesleria		*Sesleria cærulea.*	27
Cynosurus.	Outer palea terminating in a short awn not half the length of the palea	*Cynosurus cristatus.*	28
	Outer palea terminating in a long awn as long as the palea	*Cynosurus echinatus.*	28
Dactylis		*Dactylis glomerata*	29
Arundo		*Arundo phragmites.*	29
Triodia		*Triodia decumbens.*	30
Briza		*Briza media.*	30
Hierochloe		*Hierochloe borealis.*	31

Poa.	Florets webbed	1.	
	Florets not webbed	4.	
1.	Upper leaf much longer than the sheath	2.	
	Upper leaf about as long or longer than the sheath	3.	
2.	Ligule of upper sheath short and rounded	*Poa pratensis.*	31
	Ligule of upper sheath long and pointed	*Poa trivialis.*	35
3.	Ligule scarcely perceptible. Outer palea 5-ribbed	*Poa nemoralis.*	36
	Ligule prominent. Outer palea three-ribbed	*Poa compressa.*	37
4.	Florets hairy at the base	5.	
	Florets not hairy	12.	
5.	Outer palea three-ribbed	6.	
	Outer palea five-ribbed	7.	
6.	Panicle erect. Upper leaf linear, folded	*Poa alpina.*	37
	Panicle drooping. Upper leaf lanceolate, flat	*Poa laxa.*	38
7.	Upper joint situated above the centre of the stem	8.	
	Upper joint situated below the centre of the stem	9.	
8.	Second sheath not reaching to the first joint	*Poa Polynoda.*	39
	Second sheath extending beyond the first joint	*Poa montana.*	39
9.	Small glume reaching beyond the base of the third floret	10.	
	Small glume not reaching beyond the base of the second floret	11.	

Genera.		*Species.*	*Plate*
10.	Rachis and branches rough	*Poa cæsia.*	40
	Rachis and branches smooth	*Poa annua.*	40
11.	Rachis and branches rough to the touch	*Poa distans.*	41
	Rachis and branches smooth to the touch	*Poa maritima.*	42
12.	Glumes with a prominent lateral rib on each side	*Poa procumbens.*	42
	Glumes without lateral ribs	13.	
13.	Lower half of the central rib of outer palea, smooth	14.	
	Central rib of outer palea rough the whole length	15.	
14.	Summit of the upper glume reaching to the base of the third floret	*Poa rigida.*	43
	Summit of the upper glume reaching to the base of the fourth floret	*Poa loliacea.*	43
15.	Outer palea three-ribbed	*Poa sylvatica.*	44
	Outer palea seven-ribbed	16.	
16.	Panicle compound. Spikelets not exceeding a quarter of an inch in length	*Poa aquatica.*	44
	Panicle simple. Spikelets usually an inch in length	*Poa fluitans.*	45
Bucetum.	Inflorescence racemed, approaching to a spike	*Bucetum loliaceum*	45
	Inflorescence panicled	1.	
1.	Panicle simple	*Bucetum pratense.*	46
	Panicle compound	2.	
2.	Awn considerably shorter than the palea	*Bucetum elatius.*	46
	Awn much longer than the palea	*Bucetum giganteum.*	47
Bromus.	Large glume seven-ribbed	1.	
	Large glume three-ribbed	4.	
1.	Summit of the upper glume midway between its base and summit of the third floret	2.	
	Summit of the upper glume midway between its base and summit of the second floret	3.	
2.	Florets and glumes hairy	*Bromus mollis.*	48
	Florets and glumes not hairy	*Bromus racemosus.*	48

Genera.		*Species.*	*Plate.*
3.	Twice the width of the outer palea considerably more than the length of the palea	*Bromus secalinus.*	49
	Twice the width of the outer palea equal to the length of the palea	*Bromus arvensis.*	49
4.	Awns of the florets much longer than the calyx. 5.		
	Awns of the florets much shorter than the calyx. 6.		
5.	Spikelets drooping. Awns longer than the florets	*Bromus sterilis.*	50
	Spikelets erect. Awns equal in length to the florets	*Bromus diandrus.*	50
6.	Lower floret about one-third longer than the small glume	*Bromus erectus.*	51
	Lower floret twice the length of the small glume	*Bromus asper.*	51
TRISETUM.	Radical leaves hairy. 1.		
	Radical leaves not hairy	*Trisetum pratense.*	52
1.	Ligule long and acute	*Trisetum pubescens.*	53
	Ligule very short and obtuse	*Trisetum flavescens.*	54
FESTUCA.	Awns much longer than the florets.	*Festuca bromoides.*	54
	Awns much shorter than the florets.	1.	
1.	Root fibrous. Stem under the panicle rough	*Festuca ovina.*	56
	Root creeping. Stem under the panicle smooth.	*Festuca duriuscula.*	58
TRITICUM.	Spikelets long, on short footstalks	*Triticum sylvaticum.*	61
	Spikelets short without footstalks. 1.		
1.	Stem rough	*Triticum cristatum.*	61
	Stem smooth. 2.		
2.	Awns rather longer than the florets	*Triticum caninum.*	62
	Awns very short or wanting. 3.		
3.	Rachis rough	*Triticum repens.*	62
	Rachis smooth	*Triticum junceum.*	63
ELYMUS.		*Elymus arenarius.*	64
LOLIUM.	Florets awned. Glume longer than the spikelet.	*Lolium temulentum.*	64
	Florets not awned. Glume shorter than the spikelet	*Lolium perenne.*	65

GRASSES OF SCOTLAND.

GRASSES OF SCOTLAND.

NINETY-FOUR SPECIES.

CLASS MONOCOTYLEDONES.

Stem with no distinction of bark, wood, and pith; increasing in the centre, so that the oldest formation is external. Leaves with parallel veins. Cotyledon one; radicle inclosed in a sheath.

ORDER GRAMINEÆ of Jussieu.

Root fibrous, creeping, or bulbous. *Stem* cylindrical, hollow, closed at the joints, bearing leaves with a split sheath, through which the stem passes.

Inflorescence spiked, racemed, or panicled. *Flowers* or *spikelets* consisting of a calyx containing one, two, or many florets.

Calyx situated the most external, composed of two glumes, rarely of one only, or entirely wanting; the upper glume generally the largest.

Florets of two paleæ, seldom of only one, (*corolla*, Linn. *perianth*, Brown,) the outer the largest, generally keeled, having one, three, five, or many longitudinal ribs; often bearing from the summit, back, or base, an awn of various lengths; the *inner palea* with usually two distant, fringed ribs, each at a lateral fold.

Nectary (squamulæ of Brown) of one or two minute, membranous or fleshy scales, beneath the ovarium, either both on one side or opposite to each other, sometimes entirely wanting.

Stamens of filaments and anthers, arising from below the ovarium; *filaments* long and slender; *anthers* of two cells, prominent, pendulous, forked, and divaricated at the end.

Pistils mostly two, rarely three, and very rarely one only; either distinct or partly combined, arising mostly from the summit of the ovarium; composed of a style and stigma. *Styles* vastly short and smooth. *Stigmas* rough or feathery, sometimes branched or compound.

Ovarium of one seed. *Pericarp* a thin membranous skin, covering the seed, and adhering so firmly as to be scarcely distinguishable from the seed.

Albumen farinaceous, interposed between the embryo and integuments of the seed.

Embryo a lenticular body lying on one side of the albumen, composed of a pumula, cotyledon, and radicle; the pumula a conicle projection, inclosed in a membranous sheath of its own, from whence, when burst, the primary leaves of the young plant are protruded.

The number at the commencement of each genus refers to the corresponding number of the species.

GENERA.

* *Calyx wanting.*

1. NARDUS.—Spikelets sessile, of one floret, arranged on one side of the rachis. Of this genus we have but one species. (Plate II.)

* * *Calyx containing but one Floret.* *

2. ROTTBOLLIA.—Spikelets sessile, arranged on each side of the rachis. Calyx of two, lanceolate, parallel valves, spreading only whilst in flower. One species. (Plate II.) On some occasions the calyx contains two florets.

3. ALOPECURUS.—Inflorescence a dense panicle. Floret of only one palea, very little shorter than the calyx, with a long dorsal awn arising from below the centre, which in *A. alpinus* is sometimes wanting. Five species. (Plates III. IV. V.)

8. PHLEUM.—Inflorescence a dense panicle. Floret of two paleæ, much shorter than the calyx; outer palea occasionally with a minute awn arising from the summit. Base of floret without hairs or appendages. Four species. (Plates VI. VII.)

12. ANTHOXANTHUM.—Inflorescence a close panicle of an ovate-oblong form. Glumes of the calyx very unequal. Floret of two hairy paleæ of equal length, both awned, much shorter than the calyx. One species. (Plate VIII.)

13. AMMOPHILA.—Inflorescence a close panicle of an oblong form. Glumes of the calyx narrow, acute, not awned. Floret very little shorter than the calyx, tipped with a short awn, hairy at the base. One species. (Plate VIII.)

14. PHALARIS.—Inflorescence compact or branched. Floret hairy, not awned, with two hairy or membranous valves at the base,

* A rudiment of a second floret is equivalent to a perfect floret, and therefore belongs to the next division. *Melica uniflora* and *Molinea depauperata* are the only examples. (Plates XVIII. XIX.)

about half the length of the floret. Leaves broad. Ligule prominent. Two species. (Plate IX.)

16. HORDEUM.—Inflorescence racemed, dense, bristly. Spikelets in threes, arranged alternately on the toothed rachis. Glumes terminating in long, rough, bristly awns. Three species. (Plates X. XI.)

19. POLYPOGON.—Inflorescence panicled, dense. Glumes of equal lengths, linear, hairy, with long awns. Floret about half the length of the glumes, with a short terminal awn. One species. (Plate XI.)

20. AGROSTIS.—Inflorescence panicled, spreading. Glumes nearly of equal lengths, acute, not awned; outer glume the larger. Floret much shorter than the calyx, of two very unequal paleæ, sometimes the inner palea is wanting; occasionally the base is furnished with a minute tuft of hairs. Three species. (Plates XII. XIII. XIV. XV.)

23. CALAMAGROSTIS.—Inflorescence panicled, spreading. Glumes of about equal lengths, not awned. Outer glume the smaller. Floret of two very unequal paleæ; outer palea awned, furnished at the base with long straight hairs, more than half the length of the floret, sometimes longer than the floret. Two species. (Plate XVI.)

25. ANEMAGROSTIS.—Inflorescence panicled, spreading. Glumes unequal, the outer glume the smaller. Floret as long as the calyx. Outer palea with a long dorsal awn more than thrice the length of the palea. One species. (Plate XVII.)

26. MILIUM.—Inflorescence panicled, spreading, loose. Glumes nearly equal, somewhat hairy, smooth on the keels, three-ribbed. Floret nearly as long as the calyx, smooth, not awned, without lateral ribs. Leaves broad and flat. One species. (Plate XVII.)

* * * *Calyx containing two Florets.* *

27. MELICA.—Florets without awns, not longer than the calyx. Outer palea seven-ribbed. Two species. (Plate XVIII.)

29. AIROCHLOA.—Florets without awns, not longer than the calyx. Outer palea three-ribbed. One species. (Plate XIX.)

31. MOLINIA.—Florets without awns, much longer than the calyx. Leaves hairy on the inner surface. Two species. (Plates XIX. XX.)

32. CATABROSA.—Florets without awns, much longer than the calyx. Leaves not hairy. One species. (Plate XX.)

33. HOLCUS.—Upper floret awned from a little beneath the summit; the lower floret mostly not awned. Calyx longer than the florets. Two species. (Plates XXI. XXII.)

35. AIRA.—Florets awned from beneath the centre. Glumes of about equal lengths. Five species. (Plates XXIII. XXIV. XXV.)

40. ARRHENATHERUM.—Lower floret awned from a little above the base; the upper floret from a little beneath the summit. Glumes very unequal. One species. (Plates XXV. XXVI.)

41. AVENA.—Florets awned from a little beneath the centre. Glumes not less than seven ribbed. Two species. (Plates XXVI. XXVII.)

43. SESLERIA.—Florets with a short awn from the summit; longer than the calyx. Glumes of about equal lengths. Inflorescence close, compact, of an oval form. One species. (Plate XVII.)

* Exceptions. Some species of the genus *Poa* (of the next division) have but two florets in each calyx, which are readily distinguished by the outer palea having no awn, with the lower half of the keel hairy. *Rottbollia* of the preceding division has occasionally two florets in each calyx.

* * * * *Calyx containing three or more Florets.* *

44. CYNOSURUS.—Inflorescence racemed, unilateral, with a pectinated involucre at the base of each spikelet. Florets tipped with a rough awn. Two species. (Plate XXVIII.)

46. DACTYLIS.—Panicle tufted. Calyx hairy. Florets tipped with a short awn. One species. (Plate XXIX.)

47. ARUNDO.—Panicle large and spreading. Florets not awned. Inner palea half the length of the outer palea. Footstalk of the second floret with very long hairs. One species. (Plate XXIX.)

48. TRIODIA.—Florets not protruding beyond the calyx, without awns. Sheaths of leaves crowned with a tuft of hairs. One species. (Plate XXX.)

49. BRIZA.—Florets not awned, obtuse. Outer palea without lateral ribs, broad, lobed at the base. Glumes obtuse, nearly equal, three ribbed. Panicle spreading. One species. (Plate XXX.)

50. HIEROCHLOE.—Florets not more than three in each spikelet, not awned, hairy, not protruding beyond the calyx. Glumes broad, acute, nearly equal, without lateral ribs. One species. (Plate XXXI.)

51. POA.—Florets not awned, hairy or woolly at the base or keel. Large glume three-ribbed. (Plates XXXI. to XLII.). Florets not hairy, five-ribbed, tipped with a very minute point. Glumes three-ribbed. (Plate XLII.). Florets not hairy, tipped with a very minute point. Glumes without lateral ribs. (Plate XLIII.). Florets not hairy, acute, three-ribbed. Glumes narrow without lateral ribs (Plate XLIV.). Florets not hairy, seven-ribbed. Glumes without lateral ribs. Eighteen species. (Plates XLIV. XLV.).

* Exceptions. Some species belonging to the two floret division have occasionally three florets, viz. *Melica nutans*—florets not longer than the calyx, without awns; outer palea seven-ribbed; glumes five-ribbed. (Plate XVIII.) *Molinea cærulea*—florets much longer than the calyx, not awned; outer palea three-ribbed; glumes three-ribbed. (Plate XX.) *Aira cæspitosa*—lower floret shorter than the calyx, awned from a little above the base.

69. BUCETUM.—Florets membranous at the summit, occasionally with a dorsal awn arising from a little beneath the summit of the outer palea. Inner palea minutely and closely fringed. Styles arising from the summit of the ovarium. Ligule of the upper sheath very short, scarcely perceptible. Four species. (Plates XLV. XLVI. XLVII.)

73. BROMUS.—Florets membranous at the summit, with a prominent dorsal awn arising from a little beneath the summit of the outer palea. Inner palea strongly and rather distantly fringed. Styles arising from below the summit of the ovarium. Ligule of the upper sheath prominent. Eight species. (Plates XLVIII. XLIX. L. LI.)

81. TRISETUM.—Florets membranous at the summit, hairy at the base, with a long dorsal awn arising from about the centre of the outer palea. Outer palea five-ribbed. Three species. (Plates LII. LIII. LIV.)

84. FESTUCA.—Florets awned from the very summit of the outer palea. Leaves of the root not broader than those of the stem. Three species. (Plates LIV. LV. LVI. LVII. LVIII. LIX. LX.)

87. TRITICUM.—Spikelets either sessile or on very short footstalks, arising alternately on each side of the rachis. Calyx of two glumes situated opposite to each other. Five species. (Plates LXI. LXII. LXIII.)

92. ELYMUS.—Spikelets sessile arising in pairs on each side of the rachis. Calyx of two glumes situated parallel to each other. One species. (Plate LXIV.)

94. LOLIUM.—Spikelets sessile, arising alternately on each side of the rachis. Calyx mostly of only one glume situated opposite to the rachis; the inner glume when present is situated with its back to the rachis. Two species. (Plate LXV.)

SPECIES.

1. Nardus stricta.*

Mat-Grass.

Specific Characters.—Lower leaves more than twice the length of their sheaths. (Plate II.)

Description.—It grows from five to eight inches high. The root is perennial, with numerous strong, downy fibres, surrounded at the base with a tuft of old leaves. *Stem* erect, compressed and smooth, (occasionally roughish) bearing four or five leaves with smooth, striated sheaths, the upper sheath longer than its leaf, crowned with an acute membranous ligule; lower sheaths much shorter than their leaves. *Joints* situated low down the stem. *Leaves* involute, bristle-shaped, roughish at their margins, acute, striated, harsh, rigid, slightly curved, and suddenly divaricating from their sheaths. *Inflorescence* spiked. *Spike* erect, close, especially before and after flowering. *Spikelets* lanceolate, acute, of a purplish tinge, *of one floret;* arranged in two rows on one side of the rachis only, leaving the opposite side perfectly bare. *Calyx none. Florets* of two paleæ (Fig. 1), the outer palea tipped with a short rough awn; without lateral ribs; the keel and margins minutely toothed. *Inner palea* membranous, linear lanceolate, entire, about one-third shorter than the outer palea. *Filaments* slender, shorter than the palea. *Anthers* oblong. *Ovarium* oblong, slender. *Style* one. *Stigma* one, long and feathery. *Seed* one, linear and pointed at each end.

Obs.—This grass to the agriculturist is considered to be comparatively of no value, as it is but seldom eaten by cattle, owing to the rigid, harsh, and wiry texture of the leaves. It is common on dry moors and heaths throughout the whole of Scotland, England, and Ireland, as well as in Lapland, Norway, Sweden, and Germany. It is found in the most northern parts of North America, but is unknown

* *Nardus stricta*, Linnæus. Leers's *Flora Herbornensis.* Koch's *Synopsis Florae Germanicae et Helveticae.* Knapp's *Gramina Britannica.* Smith's *English Flora.* Sowerby's *English Botany.* Sinclair's *Hortus Gramineus Woburnensis.* Hooker's *British Flora.* Hooker's *Flora Scotica.* Lindley's *Synopsis of the British Flora.* Greville's *Flora Edinensis.*

in the United States. Its most southern limit seems to be about latitude 40. Flowers in the first and second weeks of July, and ripens its seed about the first week in August. It has occasionally been found at an elevation of nearly 4000 feet above the sea.

2. Rottbollia incurvata. *

Hard Sea-Grass.

Specific Characters.—Stem round. Spike curved. (Plate II.)

Description.—It grows from three to six inches in length. The root is annual, fibrous. *Stem* round, smooth, striated and polished, decumbent at the base, and bent at the joints; bearing six or seven leaves, with smooth, striated sheaths more or less inflated, crowned with a very short obtuse ligule. *Joints* smooth, the lower ones often throwing out lateral shoots. *Leaves* narrow, acute, smooth and involute. *Inflorescence* spiked. *Spike* cylindrical, elongated, curved. *Spikelets* alternately disposed along the rachis; of one, sometimes two awnless florets. *Calyx* of two flattish, lanceolate, acute, four-ribbed glumes, (Fig. 1.) placed in front of the rachis, mostly close, but spreading while in flower. *Florets* of two paleæ (Fig. 2.) rather shorter than the glumes; membranous, linear, without ribs or awns; entire at the margins. *Scales* acute. *Filaments* capillary. *Anthers* pendulous, cloven at each end. *Ovarium* oblong, obtuse, in one floret only. *Styles* short. *Stigmas* feathery, widely spreading. *Seed* elliptic, oblong, shut up in the cavity of each joint of the rachis by the closed glumes.

—— —— *filiformis.* A slender upright variety, with the stem somewhat compressed. (Plate III.). Found in salt marshes near Aberlady.

Obs.—This grass grows in salt marshes along the coast, but is of no agricultural use. It is found on the east and west coasts of Scotland, but does not exist either in the Orkney or Shetland Isles, or further north than latitude 56. In England it grows along the shores of Northumberland, Durham, Flint, Denbigh, Anglesea, Gloucester, Norfolk, Essex, Kent, Sussex, Somerset, Devon. It is frequent along

* *Rottbollia incurvata,* Linn. Smith, Hooker. *Ophiurus incurvatus,* Beauv., Lindley. *Lepturus incurvatus,* Koch.

the Irish coast, and also on the shores of the Mediterranean, but has not been discovered in America.

Flowers in the third week of July, and ripens its seed in the second week of August.

3. Alopecurus agrestis. *

Slender Foxtail-Grass.

Specific Characters.—Stem and sheaths rough. Awn projecting more than half its length beyond the palea. (Plate III.)

Description.—It grows from one to two feet high. The root is annual, small and fibrous. *Stem* erect, round, slender, roughish to the touch, (from below upwards), bearing three or four leaves with roughish, striated, slightly swollen sheaths; the upper sheath longer than its leaf, crowned with a prominent, obtuse, downy ligule. *Joints* smooth. *Leaves* flat, acute, striated, roughish on both surfaces, as well as on the margins. *Inflorescence* simple panicled. *Panicle* erect, slender, compact, tapering at each end; of two to three inches in length, with short branches, arranged on all sides of the rachis. *Spikelets* numerous, compressed, of an oval form, of one awned floret, equal in length to the calyx. *Calyx* of two membranous acute glumes (Fig. 1.), of equal lengths, united at the lower part, fringed on the keels with short hairs, and furnished with two green smooth ribs on each side. *Floret* of one palea, (Fig. 2.) of an ovate-oblong form, furnished with two green ribs on each side towards the upper part. *Awn* long and slender, smooth on the lower half, arising from a little above the base of the palea, and extending more than half its length beyond the palea. *Filaments* three, slender. *Anthers* protruding, notched at each extremity. *Styles* short, united. *Stigmas* two, long and downy.

Obs.—This grass is easily recognized by the long narrow panicle tapering at each extremity; the long dorsal awn which projects more than half its length beyond the palea; the keels of the glumes with very short hairs; and the rough stem and sheaths.

It is distinguished from *Alopecurus pratensis* in the panicle being more slender; *spikelets* larger; *ligule* much longer; keels of the calyx but slightly hairy, and the stem and sheaths rough to the touch;

* *Alopecurus agrestis*, Koch, Smith, Hooker, Lindley, Leers.

—whereas in *A. pratensis* the *ligule* is short and obtuse. Keels of the calyx and lateral ribs with long hairs, and the stem and sheaths perfectly smooth.

From *Alopecurus geniculatus*, in the *panicle* being more tapering at the extremities; *ligule* longer; *spikelets* larger; *awns* longer; *Calyx* more acute and somewhat of a different form, and not so hairy at the keels; *stem* and sheaths rough to the touch;—whereas in *A. geniculatus* the stem and sheaths are perfectly smooth.

From *Alopecurus fulvus*, in the *panicle* being more tapering at the extremities; *spikelets* larger; *ligule* longer; keels of the calyx but slightly hairy; *awn* projecting more than half its length beyond the calyx; *stem* and sheaths rough to the touch;—whereas in *A. fulvus* the awn of the floret does not project beyond the calyx, and the stem and sheaths are perfectly smooth.

This grass is said to be one of the most inferior for agricultural purposes, as no description of cattle seems to touch it. It grows best in poor soil, and will bear many cuttings in the same season. When once it takes possession of the soil, it becomes difficult to extirpate. To farmers it is known by the name of black bent, and is a very troublesome grass in many places amongst wheat. Pheasants, partridges, and birds generally are said to be fond of the seed, which is produced in considerable abundance.

In Scotland this grass is occasionally met with, but by no means common. In England it is found in Northumberland, Durham, York, Nottinghamshire, Cheshire, Worcester, Warwick, Leicester, Oxford, Bedford, Cambridge, Norfolk, Suffolk, Essex, Surrey, Kent, Sussex, Somerset, and Devon. It has not been found either in Ireland or America. Is common in the south of Europe, but does not exist further north than latitude 56.

Flowers in the first week of July, and ripens its seed in October.

4. Alopecurus pratensis. *

Meadow Fox-tail Grass.

Specific Characters.—Stem smooth. Awn projecting more than half its length beyond the palea. (Plate IV.)

* *Alopecurus pratensis*, Koch, Leers, Smith, Hooker, Lindley, Greville.

Description.—It grows from one to three feet high. The root is perennial, fibrous. *Stem* erect, round, *smooth*, and striated, bearing four or five leaves, with smooth, somewhat inflated sheaths; the upper sheaths longer than its leaf, crowned with a short, obtuse ligule. *Joints* smooth. *Leaves* flat, acute, generally rough on both surfaces; the radical leaves mostly smooth on the under surface. *Inflorescence* compound panicled. *Panicle* erect, from one to two inches in length, of an oblong form approaching to cylindrical, compact, close, with very short branches arranged on all sides of the rachis. *Spikelets* numerous, compressed, imbricated, of an ovate form, erect, turning of a light greyish brown with age; of one awned floret, equal in length to the calyx. *Calyx* of two glumes (Fig. 1.) of equal lengths, acute, united at the base, fringed on the keels and lateral ribs, which are of a light green. *Floret* of one palea of an ovate-oblong form, with two green ribs on each side; furnished with a long slender, dorsal awn, arising from a little above the base, and extending more than half its length beyond the summit of the palea; upper part of the keel more or less hairy. *Anthers* prominent, yellow. *Styles* united. *Stigmas* separate, slender, and feathery. Seed ovate.

Obs.— *Alopecurus pratensis* is distinguished from *Alopecurus geniculatus* in the *upper leaf* being not more than half the length of its sheath; *awn* projecting more than half its length beyond the palea; *palea* (when viewed from within, and made flat by throwing open the sides (Fig. 4.) of a conical form, with four, broad *distinct* green ribs; *glumes* of a different shape, more acute (Fig. 1);—whereas in *A. geniculatus* the *upper leaf* is about the length of its sheath; *awn* projecting half its length beyond the palea; *palea* (when viewed from within (Fig. 4.) obtuse, slightly notched in the centre, with four rather *indistinct* green ribs, tinged with purple at the summit.

From *Alopecurus fulvus*, in the *awn* projecting more than half its length beyond the palea;—whereas in *A. fulvus* the *awn* does not project beyond the palea. (Plate V.)

From *Alopecurus agrestis*, in the *stem* and *sheaths* being perfectly smooth;—whereas in *agrestis* the *stem* and *sheaths* are rough. (Plate III.)

From *Alopecurus alpinus*, in the *panicle* being longer; *awn* arising a little above the base, and projecting more than half its length beyond the palea;—whereas in *A. alpinus* the *panicle* is not an inch in length;

awn arising a little beneath the centre (or sometimes from the centre) and not projecting more than one-third its length beyond the palea. Frequently the awn is entirely wanting.

Alopecurus is distinguished from *Phleum* in having but one palea.

This grass to the farmer is one of the most valuable, as it is one of the earliest and best for permanent pastures, and most grateful of all grasses to every kind of cattle; but not so well adapted for hay, in consequence of the stems being few, and but sparingly furnished with leaves. It thrives best on rich land, of an intermediate quality as to moisture and dryness, such as in low meadow ground, or in boggy places which have been drained. Mr Sinclair* has shown that its produce is nearly three-fourths greater on a clayey loam than on a sandy soil, and that the quantity of nutritive matter is also greater in the proportion of three to two. The proportional value in which the grass of the latter-math exceeds that of the flowering crop is as four to three; therefore it is evident that the loss sustained by cutting this grass at the time of flowering is considerable, which is not the case with most grasses. It does not arrive to maturity until the fourth year after the seeds are sown: hence it is inferior to many grasses for the purposes of alternate cropping. In most of the rich natural pastures in Britain, it constitutes the principal grass. Its limit of altitude seems to be about 1500 feet above the sea. Throughout the whole of Britain *Alopecurus pratensis* is very common. It is also a native of Lapland, Norway, Sweden, Russia, Denmark, Holland, Germany, France, and Italy; and although now common in America, it is supposed to have been introduced. Flowers in April, May, and June, and ripens its seed in June and July.

5. Alopecurus alpinus. †

Alpine Fox-tail Grass.

Specific Characters.—Awn, when present, projecting not more than one-third its length beyond the palea. (Plate IV.)

* Sinclair's *Hortus Gramineus Woburnensis*.

† *Alopecurus alpinus*, Smith, Hooker, Lindley, Knapp. *Alopecurus ovatus without awns*, Knapp.

Description.—It grows from nine to twelve inches high. The root is perennial, somewhat creeping, with long fibres. *Stem* erect, round, and smooth, slightly procumbent at the base; bearing four leaves, with smooth striated sheaths; the upper sheath longer than its leaf, inflated, crowned with a short, obtuse ligule. *Joints* smooth. *Leaves* flat, acute, broadish, roughish on the margins and inner surface only. *Inflorescence* panicled. *Panicle* erect, not an inch in length, close, soft and silky, of an oblong form. *Spikelets* arranged on all sides of the rachis, erect, of an oval form, of one-awned floret, equal in length to the calyx. *Calyx* of two glumes (Fig. 1.) of equal lengths, acute, three-ribbed, hairy, as well as the keels and inner margins. Floret of one palea, with two ribs on each side, furnished with a slender dorsal awn (which is frequently altogether wanting), arising from a little below the centre, (sometimes from the centre), and extending about one-third its length beyond the summit of the palea. *Filaments* three, slender. *Anthers* protruding, notched at each extremity. *Styles* short, united. *Stigmas* two, long and feathery. *Seeds* ovate.

Obs.—*Alopecurus alpinus* is known by its short, oval silky-like panicle, which does not exceed an inch in length, and the short awn which arises from about the centre, and extends not more than one-third its length beyond the palea.

This grass was formerly supposed to be peculiar to the Highlands of Scotland about Loch-na-Gar, 3800 feet altitude above the sea; Clova, and Ben Lawers; but is now found in Greenland and the northern parts of British America. It does not grow in dry exposed situations, but in marshy places. Sheep are fond of the lower leaves, and leave the stems untouched. Its lower limit of altitude seems to be about 2500 feet above the sea.

Flowers in July, and ripens its seed about the end of August.

6. Alopecurus geniculatus.*

Floating Fox-tail Grass.

Specific Characters.—Awn projecting half its length beyond the palea. (Plate V.)

* *Alopecurus geniculatus*, Koch, Smith, Leers, Hooker, Lindley, Greville.

Description.—It grows from twelve to fifteen inches in length. The root is perennial, fibrous, ("owing to a dry barren situation, becomes oval and fleshy as in *Phleum pratense*," Smith.) *Stem* ascending, bent at the joints, smooth and striated, bearing branches from the lower joints. *Sheaths* smooth and strongly striated, the upper sheath inflated, about equal in length to its leaf, crowned with an oblong, membranous ligule. *Joints* smooth, long and narrow, of a darkish purple. *Leaves* flat, acute, roughish on both surfaces, serrated on the edges. *Inflorescence* simple panicled. *Panicle* erect, from one to two inches long, cylindrical, compact, with short branches, arranged on all sides of the rachis. *Spikelets* numerous, compressed, of an ovate form, erect, of one awned floret as long as the calyx. *Calyx* of two membranous glumes of equal lengths (Fig. 1), obtuse, united at the base, often tinged at the summit with purple, fringed on the keels and hairy on the lateral ribs, which are of a light green, and more prominent on the one side than on the other. *Floret* of one palea, (Fig. 2), with two rather indistinct green ribs on each side; of a purplish tinge on the upper part, which can be best seen by opening the palea, when the summit will be found to be obtuse with a small notch in the centre (Fig. 4.) *Awn* slender, arising from a little above the base of the palea, and extending half its length beyond the palea. *Filament* slender. *Anthers* linear, protruding, yellowish. *Styles* short, mostly combined. *Stigmas* distinct, long and feathery.

Obs.—*Alopecurus geniculatus* is distinguished from *Alopecurus fulvus*, in the awn arising from a little above the base and projecting half its length beyond the palea; *anthers* long and linear, of a dull orange colour;—whereas in *A. fulvus* the *awn* arises from a little below the centre, and does not project beyond the palea; *anthers* short and roundish, of a deep bright orange colour.

From *Alopecurus agrestis* in the stem and sheaths being perfectly smooth;—whereas in *A. agrestis* they are distinctly rough to the touch, from below upwards. (Plate III.)

From *Alopecurus alpinus* in the *panicle* being long and linear; *awn* arising from a little above the base and projecting half its length beyond the palea;—whereas in *Alopecurus alpinus* the *panicle* does not exceed an inch in length, of an oval form; *awn* (when present) aris-

ing from the centre or a very little below it, and projects about one third its length beyond the palea. (Plate IV.)

From *Alopecurus pratensis*, in the upper sheath being about the length of its leaf; *awn* projecting half its length beyond the palea; *palea* when opened and made flat, (Fig. 4) obtuse, slightly notched in the centre, with four rather indistinct green ribs, tinged with purple at the summit;—whereas in *A. pratensis* the upper sheath is more than twice the length of its leaf; *awn* projecting more than half its length beyond the palea; *palea* when opened and made flat, (Fig. 4). of a conical form, with four, broad, distinct green ribs. *Glumes* of a rather different shape, being more acute, (Fig. 1.)

This grass is not recommended for agricultural purposes, on account of its being but little liked either by cows, horses, or sheep; and the small quantity of herbage it yields, even when cultivated under the most favourable circumstances. It grows naturally in wet places, principally on clayey soil round the margins of pools; occasionally it is found in dry situations, when it assumes a stunted appearance. It is a common grass throughout Britain, and is also met with in Lapland, Norway, Sweden, Denmark, Germany, France, and Italy; but rare in the United States. Its limit of altitude, 2000 feet above the sea.

Flowers in the first week in June, and ripens its seed about the end of July.

7. Alopecurus fulvus.*

Orange-spiked Fox-tail Grass.

Specific Characters.—Awn not projecting beyond the palea. (Plate V.)

Description.—It grows from twelve to eighteen inches in length. The root is perennial, fibrous. *Stem* ascending, bent at the joints, procumbent at the base, smooth, bearing four or five leaves with smooth, striated sheaths; the upper sheath inflated, equal in length to its leaf, crowned with an oblong, membranous ligule. *Joints* smooth. *Leaves* flat, acute, rough on the inner surface, smooth behind. *In-*

* *Alopecurus fulvus*, Koch, Smith, Hooker, Lindley.

florescence panicled. *Panicle* erect, from one to two inches long, cylindrical, compact, with short branches, arranged on all sides of the rachis. *Spikelets* small, numerous, compressed, of an oval form, erect, of one-awned floret equal in length to the calyx. *Calyx* of two acute, membranous glumes (Fig. 1) of equal lengths, united at the lower part, three-ribbed, fringed on the keels, and hairy on the lateral ribs, which are of a light green. *Floret* of one palea (Fig. 2), with two rather distant ribs on each side; of an oval form, furnished with a slender dorsal awn arising from a little below the centre, and not extending beyond the summit of the palea. *Filaments* three, slender. *Anthers* short and roundish, notched at each end, of a yellowish colour. *Styles* short, united. *Stigmas* slender, feathery.

This grass, on account of its very great resemblance to *Alopecurus geniculatus*, has been frequently mistaken for it; but is at all times readily distinguished in the awn of the palea not extending beyond the calyx;—whereas in *A. geniculatus* the awn projects half its length beyond the calyx, which is very visible even without the aid of a glass. (See Fig. 3.)

The length of the awn will also distinguish *Alopecurus fulvus* from *Alopecurus pratensis* and *Alopecurus agrestis*, independent of any other character.

In Scotland this grass is very rare, having been found only in Angus-shire and Fifeshire. In England it is met with in Essex, Norfolk, Cambridge, Worcester, and Denbigh. It has not been found in Ireland, nor has mention been made of its occurrence in America or southern parts of Europe. Linnæus seems to have noticed it in Lapland as a variety of *Alopecurus geniculatus* with a short awn.

It grows by the margins of pools in rather moist situations, and flowers in June. Its habits are similar to that of *Alopecurus geniculatus*, and probably of no greater agricultural importance.

8. Phleum pratense. *

Cat's-tail Grass or Timothy Grass.

Specific Characters.—Glumes more than twice the length of their awns. (Plate VI.)

* *Phleum pratense*, Linn. Koch, Leers, Smith, Hooker, Lindley, Greville, Knapp.

Description.—It grows from eighteen inches to two feet high. The root is perennial, somewhat creeping, occasionally bulbous. *Stem* erect, round and smooth, bearing four or five leaves with nearly smooth sheaths; the upper sheath longer than its leaf, crowned with an oblong, membranous ligule. *Joints* smooth. *Leaves* flat, broadish, acute, roughish on both surfaces as well as on the margins. *Inflorescence* simple panicled. *Panicle* erect, close, of a cylindrical form, *from two to five inches long,* variegated with green and white. *Spikelets* small and numerous, compressed, (Fig. 3), arranged in pairs on very short footstalks around the rachis; of one slightly awned floret, much shorter than the calyx. *Calyx* of two glumes of equal lengths, (Fig. 1), with a *broad, obtuse,* membranous margin; the keels fringed with short stout white hairs; *each glume terminating in a stout, rough awn not half the length of the glume. Floret* of two membranous paleæ (Fig 2), the outer palea ovate, five-ribbed; *jagged at the summit,* hairy on the keel, *terminating in a minute awn. Inner palea* shorter than the outer palea, membranous, with the margins delicately fringed.

Obs.—Phleum pratense is distinguished from *Phleum alpinum* in the *panicle* being much longer and the *glumes* more than twice the length of their awns;—whereas in *P. alpinum* the *panicle* never exceeds an inch in length, and the *glumes* are not more than one-third longer than their awns. It is stated by several authors that the glumes of *P. alpinum* are equal in length to their awns, but in all those that I have examined the glumes are *one-third longer* than their awns. As this is one of the most important characters by which these two grasses are distinguished, it renders the greatest accuracy the more essential.

From *Phleum arenarium* in the *glumes* being obtuse and awned, and the *floret* more than half the length of the calyx;—whereas in *P. arenarium* the *glumes* are acute, not awned, and the *floret* is not more than one-third the length of the calyx. (Plate VII.)

From *Phleum Michelii* in the *spikelets* being much smaller; the *glumes* obtuse and awned, and the *floret* tipped with a minute awn;—whereas in *P. Michelii* the *spikelets* are large; the *glumes* acute but not awned; and the *floret* entire at the summit. (Plate VII.)

It is stated that this grass was first recommended for agricultural use about eighty years ago under the name of Timothy-grass,—an ap-

pellation which it received from Timothy Hanson, who cultivated it on a considerable scale in North America for agricultural purposes. It is a hard coarse grass, not much liked either by horses, cows, goats, or sheep, and swine refuse it. It has been highly recommended for the purpose of hay, as the stems during the time the seeds are ripe contain more nutritive matter than the stems of most other grasses; but the deficiency in the produce of the after-math and the slowness of its growth after being cut, are defects which are not compensated by the superior quantity of nutritive matter contained in the stems of the seed crop. It is therefore the opinion of Mr Sinclair, that it is unfit for cultivation by itself as an alternate husbandry grass, but of great value as a constituent of any mixture of grasses for permanent pasture, or the alternate husbandry, where it should always form a part of the crop. It grows best in moist tenacious soils, and is common throughout the whole of Britain. It also occurs in Lapland, Norway, and Sweden, and as far south as the Mediterranean. It has been found in the most northern parts of North America, but is supposed to have been introduced into the United States. Its limit of altitude about 1500 feet above the sea.

Flowers in the third week in June, and ripens its seed in the end of July.

9. Phleum alpinum.*

Alpine Cat's-tail Grass.

Specific Character.—Glumes one-third longer than their awns. (Plate VI.)

Description.—It grows from six to twelve inches high. The root is perennial, knotty, and somewhat creeping. *Stem* erect, round, and smooth, bearing four or five leaves with smooth, striated sheaths; the upper leaf inflated, longer than its leaf, crowned with a short, obtuse ligule. *Joints* smooth. *Leaves* flat, acute, smooth on both surfaces, roughish on the margins. *Inflorescence* simple panicled. *Panicle* erect, close, bristly, *not exceeding an inch in length*, of an oval form, tinged with brownish purple. *Spikelets* small and nume-

* *Phleum alpinum*, Linn. Koch, Smith, Hooker.

rous, compressed, (Fig. 3), arranged on the rachis on very short footstalks; of one minutely awned floret, shorter than the calyx. *Calyx* of two glumes of equal lengths, (Fig. 1), with a *broad, obtuse* membranous margin; the keels fringed with short, stout, white hairs; *each glume terminating in a stout, rough awn, more than half the length of the glume,* (but not as long as the glume.) *Floret* of two membranous paleæ, (Fig. 2), the outer palea ovate, five-ribbed, *jagged at the summit,* hairy on the keel, *terminating in a minute, rough, dorsal awn. Inner palea* rather shorter than the outer palea, membranous, with the margins delicately fringed.

Obs.—Phleum alpinum is at all times easily distinguished by its short, oval, bristly panicle. The only species that it is likely to be confounded with is *Alopecurus alpinus,* whose panicle is soft and silky. The glumes of the calyx acute but not awned, and the floret of only one palea. (See Plate IV.)

This grass is found on several of the Highland mountains in Scotland, growing in rather moist situations about 3500 feet above the sea; on Craigneulict, a hill above Killin, Garway moor, Ben Lawers, Clova mountains. It does not exist either in England or Ireland. It is common in Lapland, Norway, and Sweden, and also in Germany and Switzerland. It is found in the most northern parts of North America, but is unknown in the United States. It is of no material agricultural use, as sheep seldom eat it. Its lower limit of altitude about 2500 feet above the sea. Flowers in July, and ripens its seed about the end of August.

10. Phleum arenarium.*

Sea Cat's-Tail Grass.

Specific Characters.—Glumes lanceolate. Floret one-third the length of the calyx. (Plate VII.)

Description.—It grows from three to fifteen inches high. The

* *Phleum arenarium,* Linn. Smith, Hooker, Lindley, Greville, Koch. *Phalaris arenaria,* Knapp.

root is annual, composed of many long simple slender fibres. *Stem* erect, smooth, not striated, round and polished, the upper part generally of a purplish tinge ; bearing four or five leaves with smooth striated, somewhat swollen sheaths ; the upper sheath more than twice the length of its leaf, crowned with an obtuse ligule embracing the stem. *Joints* naked. *Leaves* short, rather broad for their length, acute, roughish to the touch on both surfaces. *Inflorescence* simple panicled. *Panicle* erect, crowded, dense, of an oval form, *narrow at the base*, with very short branches, about one-third the length of the glumes, the rachis rough and hairy. *Spikelets* numerous, of an oval form, (Fig. 3), imbricated round the rachis ; of one awnless floret about *one-third* the length of the calyx. *Calyx* of two equal membranous *lanceolated* glumes, (Fig. 1), fringed on the *upper half* of the keel as well as on the inner margins. *Floret* of two paleæ, (Fig. 2), the outer palea membranous, five-ribbed ; *notched* on the summit ; hairy on the keel. *Inner palea* membranous, obtuse, notched at the summit, about equal in length to the outer palea, and entire at the margins.

Obs.—This grass, independent of the form of the panicle and other characters, is at all times recognized by the small size of the floret, which is not more than one-third the length of the acute calyx.

It is distinguished from *Phleum pratense* in being a smaller plant ; the *panicle* somewhat contracted at the base ; *glumes* lanceolate, not awned, and of a different form, with the inner margins hairy ; *floret* not awned, very small, about one-third the length of the calyx ; —whereas in *P. pratense* the panicle is cylindrical ; *glumes* awned ; inner margins not hairy ; *floret* tipped with a small awn, and more than half the length of the calyx.

From *Phleum Michelii* in the *panicle* being more compact ; *spikelets* much smaller ; *glumes* not hairy on the lower half of the keels ; *floret* one-third the length of the palea, and notched at the summit ; —whereas in *P. Michelii* the *panicle* is soft to the touch ; *spikelets* rather large ; *glumes* hairy the whole length of the keels ; *floret* one-third shorter than the calyx, and entire at the summit.

This grass has been applied to no agricultural use. It grows on

loose blowing sand near the sea shore. In Scotland it is not uncommon, especially along the Fifeshire coast. In England, it is found on the shores of Northumberland, Durham, Cheshire, Denbigh, Norfolk, Suffolk, Kent, Sussex, Somerset, and Devon. Found occasionally in Ireland, but not met with in Lapland, Norway, or Sweden, but confined more to the south of Europe. It is unknown in America.

Flowers in the second week of July, and ripens its seed in the third week of August.

11. Phleum Michelii.*

Michelian Cat's-tail Grass.

Specific Characters.—Glumes lanceolate. Floret entire at the summit, more than half the length of the calyx. (Plate VII.)

Description.—It grows from one to two feet high. The root is perennial, fibrous, somewhat creeping. *Stem* erect, round, smooth and polished; bearing three or four leaves with smooth, striated sheaths; the upper sheath much longer than its leaf, somewhat inflated, crowned with an obtuse membranous ligule. *Joints* smooth. *Leaves* flat, acute, broadish for their length; radical leaves numerous, roughish on both surfaces, as well as on the edges. *Inflorescence* panicled. *Panicle* from one to three inches long, cylindrical, soft, compact, erect. *Spikelets* numerous, compressed, (Fig 3), arranged on all sides of the rachis; of one awnless floret shorter than the calyx. *Calyx* of two membranous, *lanceolate* glumes (Fig. 1), of equal lengths, furnished with a number of delicate white hairs, especially on the keels and two lateral ribs. *Floret of two paleæ*, (Fig. 2); the outer palea of an ovate form, five-ribbed, roughish on the keel, *entire at the summit. Inner palea* rather shorter than the outer palea, membranous, bifid at the summit, and delicately fringed at the margins.

Phleum Michelii is distinguished from *Phleum pratense* in the *glumes* of the calyx being acute-lanceolate. *Outer palea* entire at the summit;—whereas in *P. pratense* the *glumes* are obtuse, each furnished at the summit with an acute, stout awn, nearly half the length

* *Phleum Michelii*, Koch, Smith, Hooker, Lindley. *Phalaris alpina*, Hœnke.

of the glume. Outer palea toothed at the summit, and tipped with a minute point or awn.

From *Phleum arenarium* in the *keels* of the glumes being hairy the whole length ; *floret* one-third shorter than the calyx, and entire at the summit ;—whereas in *P. arenarium*, the *keels* of the glumes are without hairs on the lower half; *floret* one-third the length of the calyx, and notched at the summit.

This very rare grass was discovered several years ago by the late Mr Don on the rocky parts of the high mountains of Clova in Angus-shire, but has not since been found in Britain by any other botanist. It is a native of the south of Europe. It has not been discovered in America, or farther north than latitude 57°. Flowers in July and August.

12. Anthoxanthum odoratum.*

Sweet-scented Vernal grass.

Specific Character.—Base of leaves hairy. (Plate VIII.)

Description.—It grows from twelve to eighteen inches high. The root is perennial, fibrous. *Stem* slender, round, striated, polished, smooth, occasionally roughish; bearing two or three leaves with roughish (when felt from below upwards) striated, frequently hairy sheaths; the upper sheath longer than its leaf, crowned with a long membranous ligule, furnished with hairs at the base. *Joints* long, situated wide apart. *Leaves* flat, acute, light green, ribbed, more or less hairy on both surfaces, and rough at the margins. *Inflorescence* simple panicled, close, appearing as if spiked. *Panicle* erect, about an inch and a-half in length, of an ovate-oblong form, with short, hairy, wavy, branches, arranged alternately on the smooth straight rachis. *Spikelets* rather large, erect, of an ovate-lanceolate form, about four or five together, turning yellowish with age; of one awned floret. *Calyx* of two very unequal acute glumes, (Fig 1), more or less hairy, especially on the keels; the large glume three-ribbed ; the outer or smaller glume without lateral ribs. *Floret* of two paleæ (Fig. 2), of equal size, about half the length of the large glume, of an oblong form, of a brownish colour, more or less hairy, furnished

* *Anthoxanthum odoratum*, Linn. Koch, Smith, Hooker, Greville, Lindley.

with two awns of unequal lengths; the smaller awn arises under the summit of the outer palea; the opposite awn, which is bent in the middle, and about three times longer, arises a little above the base of the inner palea, and extends half its length beyond the palea. *Scales* of two unequal thin membranes, clasping the base of the ovarium, (Fig. 4.) *Stamens* two, protruding beyond the spikelet. *Anthers* oblong, notched at each extremity. (Fig. 5.) *Ovarium* oblong. *Styles* short, smooth. *Stigmas* long, downy, protruding very conspicuously beyond the summit. *Seed* one, naked, acute at each end.

This grass, during the process of drying, gives out a delightful odour, similar to that of woodroof, and it is principally owing to the presence of this grass that the delightful and well-known smell of new mown hay is occasioned. Mr Sinclair, who is the best authority we have on the agricultural uses of grasses, states, that the chief property that gives merit to this grass is its early growth, though in this respect it is inferior to several other species which are later in flowering. It thrives best when combined with many different species, and is therefore a true permanent pasture grass. It does not appear to be particularly liked by cattle, though eaten in pasture in common with others. The proportional value which the grass of the latter-math bears to that of the seed crop is nearly as 13 to 9, and the proportional value of nourishment contained in the autumn grass exceeds that of the first grass of the spring, as 9 to 7. The superior nutritive qualities of its latter-math are a great recommendation for the purpose of grazing; the stalks being of but little utility, as they are generally left untouched by the cattle, provided there is a sufficiency of herbage. Its merits in respect to early growth, continuing to vegetate and throw up flowering stalks till the end of autumn, and its hardy and permanent nature, sufficiently uphold its claims to a place in the composition of all permanent pastures. This grass constitutes a part of the herbage of pastures on almost every kind of soil, though it only attains to perfection in those that are deep and moist. It is said that the flavour of mutton is greatly improved when sheep are fed on pastures where this grass abounds.

This is a most common grass throughout the whole of Europe, as well as in the most northern parts of North America, but appears to

have been introduced into the United States; its limit of altitude being about 3500 feet above the sea.

Flowers about the middle of April, and the seeds are ripe in the second or third week of June.

13. Ammophila arundinacea.*

Sea Reed.

Specific Character.—Leaves involute, sharp-pointed. (Plate VIII.)

Description.—It grows from eighteen inches to two feet high. The root is perennial, extensively creeping. *Stem* erect, smooth, shining, round, and hard, bearing three or four leaves with slightly roughish sheaths; the upper sheath about equal in length to its leaf, crowned with a long, lanceolate, membranous ligule. *Joints* smooth. *Leaves* narrow, smooth, involute, sharp-pointed, rigid, and glaucous. *Inflorescence* panicled. *Panicle* erect, dense, from three to five inches long, narrowly oval, its branches short and rough. *Spikelets* numerous, long, and narrow, of one floret, shorter than the calyx. *Calyx* of two, unequal, narrow, acute glumes (Fig. 1), without lateral ribs, roughish on the upper part of the keels. *Floret* of two paleæ, (Fig. 1), the outer palea five-ribbed, the dorsal rib minutely toothed, terminating in a short scabrous point projecting beyond the palea; the base furnished with several long, straight hairs pointing upwards. *Inner palea* about equal in length to the outer palea, membranous, linear, the margins minutely fringed.

This grass seems not to be eaten by any kind of cattle, owing probably to the coarseness and rigidity of the foliage. It, however, is of great value along the coast, as it retains the drifted sand, thereby forming an embankment which prevents the encroachments of the sea; consequently, an act of Parliament has been passed for its preservation. It grows only on the very driest sandy shores. Mats and ropes are sometimes made of this grass.

It is common in Orkney, and along most of the coast of Scotland. In England it is found on the coasts of Northumberland, Durham,

* *Ammophila arenaria*, Lindley, Koch. *Arundo arenaria*, Smith, Hooker, Greville. *Ammophila arundinacea*, Hooker, *Brit. Flora.*

Cheshire, Denbigh, Anglesea, Merioneth, Worcester, Norfolk, Essex, Kent, Somerset, Devon, and Cornwall. It is also found in Lapland, Norway, and Sweden, and as far south as the Mediterranean. It occurs in the most northern parts of America as well as in the United States.

Flowers early in July.

14. Phalaris canariensis.*

Manured Canary Grass.

Specific Characters.—Panicle globular. Base of floret with two acute lanceolate scales. (Plate IX.)

Description.—It grows from one to two feet. The root is annual, composed of a number of white fibres. *Stem* erect, smooth, slender; bearing five or six leaves, with somewhat roughish inflated sheaths; upper sheath longer than its leaf, crowned with a white membranous rounded ligule. *Joints* naked, frequently of a yellowish tinge. *Leaves* rather broad, lanceolate, acute, occasionally roughish to the touch. *Inflorescence* panicled. *Panicle* dense, globular, erect, its branches very short, about one-seventh part the length of the spikelets. *Spikelets* oval, flat, imbricated, rather large, elegantly variegated with green and white; of one awnless floret. *Calyx* of two equal compressed glumes, (Fig 1); inner margins nearly straight; outer margin convex, furnished on each side with a broad green crescent-shaped line or rib, broadest towards the upper part. *Floret* of two paleæ, (Fig. 2), the outer palea ovate, acute, hairy, with two membranous lanceolate scales at the base, about half the length of the palea. *Inner palea* hairy, rather shorter than the outer palea. *Seeds* polished.

Obs.—Although this grass, in its general appearance, is very unlike the following species, yet in the structure of their florets they are very similar. It is a native of the Canary Isles and southern parts of Europe, and is now become naturalized in Britain as well as in America. It is cultivated principally for its seed, which is considered superior to any other kind of food for canaries and other small birds. The herbage is of little value.

* *Phalaris canariensis*, Linn. Smith, Hooker, Lindley, Koch, Greville.

Flowers in the first week in July, and ripens its seed in the end of August.

15. Phalaris arundinacea.*

Reed Canary Grass.

Specific Characters.—Panicle long and narrow. Base of floret with two linear tufts of hairs. (Plate IX.)

Description.—It grows from two to five feet high. The root is perennial, creeping, with long horizontal shoots. *Stem* erect, round, smooth; bearing five or six leaves with smooth striated sheaths; upper sheath much longer than its leaf, crowned with a long membranous decurrent ligule; the ligules on the lower sheaths more obtuse. *Joints* smooth, of a darkish purple, especially the lower ones. *Leaves* broad, of a light green, acute, harsh, flat, ribbed; the central rib the most prominent; roughish on both surfaces, but more so behind; the edges minutely toothed. *Inflorescence* compound panicled. *Panicle* erect, long, and narrow, at first close, afterwards more spreading; the rachis and branches very rough. *Spikelets* numerous, crowded, often of a purplish tinge, sometimes white or pale green, occasionally of rich shades of purple and yellow, with large dark anthers; of one awnless floret, concealed within the calyx. *Calyx* of two nearly equal acute glumes, (Fig. 1), three-ribbed; sides roughish, the keels minutely toothed, *Floret* of two paleæ, (Fig. 2), the outer palea acute, roughish, hairy at the margins, furnished at the base with two linear tufts of hairs about one-third the length of the palea, (outer corolla of Schrader). *Inner palea* rather shorter than the outer palea, membranous, glossy, with the margins of the upper part delicately fringed.

Obs.—A beautiful variety of this grass is sometimes cultivated in gardens under the name of *Painted Lady-grass* or *Ribbon-grass*, with the leaves elegantly striped with green and white, occasionally with a purplish tinge.

This grass produces a large and early crop, and will bear cutting three times during the summer, but, from the coarseness of its foliage, cattle are said not to be fond of it. It is best suited for tenacious clayey

* *Phalaris arundinacea*, Linn. Smith, Hooker, Koch, Greville.

soils. It grows naturally by the sides of rivers and standing pools. Its limit of altitude is about 1000 feet above the sea.

It is frequent in Scotland, England, and Ireland, but has not been found in Lapland, Norway, or Sweden, and does not seem to exist further north than latitude 59. It is common in Germany and the southern parts of Europe, but quite unknown in America.

Flowers in the second week of July, and ripens its seed about the middle of August.

16. Hordeum murinum.*

Wall-Barley.

Specific Characters.—Glumes of central spikelet dilated and fringed. (Plate X.)

Description.—It grows from twelve to eighteen inches high. The root is annual, fibrous. *Stem* round, smooth, erect; bearing three or four leaves, with smooth striated inflated sheaths, the upper sheath longer than its leaf, crowned with a short ragged ligule. *Joints* smooth. *Leaves* linear, acute, flat, roughish, slightly hairy on both surfaces, the edges minutely serrated. *Inflorescence* spiked. Spike usually about two inches in length, linear, very dense, and uniform; rachis jointed, very brittle, toothed; the intermediate spaces flattened and bordered. *Spikelets* arranged in threes at each tooth of the rachis, (Fig. 4); of one-awned floret. *Calyx* of the central spikelet of two glumes of equal lengths, dilated, fringed, terminating in a long straight rough awn, (Fig. 1.) *Central floret* of two paleæ; the outer palea ovate, three-ribbed, terminating in a long rough awn longer than the glumes; the inner palea membranous, pellucid, minutely fringed at the margins, and furnished with a small bristle at the base. *Lateral spikelets* pedunculated; the calyx of two glumes, (Figs. 2 and 3,) bristle-shaped, the innermost slightly dilated, and often somewhat fringed at the base. *Lateral florets* imperfect, with stamens only; of two paleæ, the outer palea three-ribbed, terminating in a long awn longer than the glumes; inner palea membranous, with a delicate bristle at the base.

Obs.—*Hordeum murinum* is distinguished from *Hordeum mariti-*

* *Hordeum murinum*, Koch, Smith, Hooker, Greville, Lindley.

mum in the *glumes* of the middle spikelet being dilated and fringed (Fig. 1), and the *inner glume* of the lateral spikelets but very slightly dilated (Fig. 2);—whereas in *H. maritimum* the *glumes* of the middle spikelet are bristle-shaped, and not fringed (Fig. 1), and the *inner glume* of the lateral spikelet is very conspicuously dilated on one side, in the form of half-ovate, (Fig. 2.)

From *Hordeum pratense*, in the *glumes* of the middle spikelet being dilated and fringed, and the *floret* of the lateral spikelet with a long awn, (Fig. 4);—whereas in *H. pratense* the *glumes* of all the spikelets are bristle-shaped and not fringed, and the *floret* of the lateral spikelets has a very short awn, (Fig. 4.)

The nutritive properties of this grass are said to be very inferior, and, as it is seldom or never eaten by any description of cattle, becomes of no agricultural use. It is very seldom found in pastures, but confined to road-sides, on dry light soil, and under walls and other barren places. Its limit of altitude seems to be about 500 feet above the sea.

It is a very common grass throughout Britain, there being scarcely a county in which it is not found. In Lapland, Norway, and Sweden, it is not known to exist. In Germany and south of Europe, it is common, but has not been discovered in America.

Flowers about the end of June, or the first week in July, and ripens its seed in the early part of August.

17. Hordeum maritimum. *

Sea-Barley.

Specific Characters.—Inner glume of lateral spikelet dilated on one side only into half-ovate. (Plate X.)

Description.—It grows from three to nine inches high. The root is annual, fibrous. *Stem* erect, prostrate at the base, round, smooth, and polished, bearing four or five leaves, with smooth striated sheaths; upper leaf rather inflated, longer than its leaf, crowned with a short obtuse membranous ligule. *Joints* smooth. *Leaves* short, acute, narrow, roughish, and somewhat hairy on both surfaces. *Inflores-*

* *Hordeum maritimum*, Koch, Smith, Hooker, Lindley.

cence spiked. *Spike* usually about an inch or rather more in length, dense and uniform ; rachis jointed, toothed alternately on each side, the intermediate spaces flattened and fringed at the borders. *Spikelets* arranged in threes on each side of the rachis, of one awned floret. *Calyx* of the central spikelet of two equal bristle-shaped rough glumes, (Fig. 1.) *Floret* of two paleæ ; the outer palea terminating in a long, rough, straight awn, longer than those of the calyx ; inner palea linear, acute, with a bristle at the base about half the length of the palea. *Lateral spikelets* pedunculated ; outer glume bristle-shaped, (Fig. 3) ; inner glume dilated into a half-ovate form, (Fig. 2), and terminating in a long rough awn. *Floret* imperfect, barren, with a short rough awn, not half the length of those of the glumes.

Obs.—Hordeum maritimum is distinguished from *Hordeum pratense* in the *inner glume* of the lateral spikelet being dilated on one side, in the form of half-ovate, (Fig. 2) ;—whereas in *H. pratense* all the *glumes* are bristle-shaped, neither dilated or fringed, (Fig. 2.)

From *Hordeum murinum* in the *glumes* of the middle spikelet being bristle-shaped, and the *inner glume* of the lateral spikelets very conspicuously dilated on one side in the form of half-ovate, (Fig. 2) ;—whereas in *H. murinum* the *glumes* of the middle spikelet are dilated and fringed, (Fig. 1), and the *inner glume* of the lateral spikelets but very slightly dilated, (Fig. 2).

Fortunately this grass is not common, for when it happens to be mixed with hay, the short rough awns irritate the gums of horses, causing inflammation and thereby disease. It is found in pastures and sandy ground near the sea.

It is of rare occurrence in Scotland, found occasionally on the coast of Angus-shire. In England it occurs along the coasts of Northumberland, Durham, York, Glamorgan, Gloucester, Norfolk, Suffolk, Essex, Kent, Sussex, Dorset, Somerset, and Devon. In Ireland occasionally. It does not appear to exist further north than the Baltic, and is frequent along the Mediterranean. It is unknown in America. Flowers in June and July.

18. Hordeum pratense. *

Meadow Barley.

Specific Characters.—All the glumes bristle-shaped. (Plate XI.)

Description.—It grows from eighteen inches to two feet or more high. The root is perennial, fibrous, ("becoming bulbous in barren ground, occasionally overflowed," Smith.) *Stem* round, smooth, erect, and glossy; bearing four or five leaves with smooth striated sheaths; the upper sheath longer than its leaf, crowned with a very short ligule. *Joints* smooth. *Leaves* linear, flat, acute, roughish, and somewhat hairy on both surfaces, the edges minutely serrated. *Inflorescence* spiked. Spike about an inch and a-half in length, dense and uniform; the rachis jointed, very brittle, toothed alternately on each side, the intermediate spaces flattened and bordered. *Spikelets* arranged in threes on each tooth of the rachis; of one-awned floret. *Calyx* of the central spikelet of two bristle-shaped glumes (Fig 1) of equal length. *Central floret* of two paleæ, the outer palea three-ribed, terminating in a long, rough awn, rather longer than the palea; inner palea acute, with a delicate bristle at the base, about half the length of the palea. *Lateral spikelets* pedunculated, the glumes bristle-shaped, (Figs. 2 and 3), rough. *Lateral floret* imperfect, furnished with a short awn, not as long as the palea; occasionally the awn is altogether wanting.

Obs.—*Hordeum pratense* is distinguished from *Hordeum murinum* in being of a taller and more slender habit, with the awns of the spikelets shorter; the *glumes* of the middle spikelet bristle-shaped, and not fringed; *florets* of the lateral spikelets with very short awns;—whereas in *H. murinum* the glumes of the middle spikelet are dilated and fringed, and the *florets* of the lateral spikelets with very long awns. (Fig. 4.)

From *Hordeum maritimum*, in being of a taller and more slender habit; all the *glumes* bristle-shaped (Fig. 2.);—whereas in *H. maritimum* the inner glume of the lateral spikelet is dilated on one side, in the form of half-ovate. (Fig. 2.)

Although this grass produces a tolerable early spring crop of foli-

* *Hordeum pratense*, Smith, Hooker, Lindley. *Hordeum nodosum*, Koch.

age, and contains a considerable quantity of nutritive matter, especially during the time of flowering, it is not recommended for hay. It is found in moist, rich ground, and irrigated meadows, never on dry sandy heaths, although it is said to be partial to dry chalky soils. It forms the principal herbage in some pastures in Norfolk that are considered excellent for sheep.

In Scotland this grass is but rarely met with; found occasionally in the neighbourhood of Edinburgh. In England it occurs in the counties of Northumberland, Durham, Nottinghamshire, Derby, Cheshire, Flint, Denbigh, Worcester, Warwick, Leicester, Oxford, Bedford, Cambridge, Norfolk, Suffolk, Surrey, Kent, Sussex, and Somerset. It has not been found either in Devon or Cornwall. In Ireland occasionally. It is confined principally to the middle parts of Europe, and does not seem to have been found in America; its limit of altitude being about 500 feet above the sea.

Flowers in the first week of July, and ripens its seed in the early part of August.

19. Polypogon monspeliensis.*

Annual Beard-Grass.

Specific Characters.—Glumes with awns more than twice their length. (Plate XI.)

Description.—It grows from nine to fifteen inches high. The root is fibrous, somewhat creeping. *Stem* erect, round, slightly roughish to the touch; bearing five or six leaves, with smooth, striated sheaths; the upper sheath longer than its leaf, crowned with a long, acute, roughish ligule. *Joints* smooth. *Leaves* flat, rather broad, acute, roughish on both surfaces, but generally smooth behind. *Inflorescence* compound panicled. *Panicle* erect, dense, lobed and silky, from one and a-half to two inches long; branches rough, rachis nearly smooth. *Spikelet* of one awned floret shorter than the calyx, (Fig. 3.) *Calyx* of two, linear, hairy, obtuse, membranous glumes, (Fig. 1), strongly toothed on the lower half of the keels; without lateral ribs;

* *Polypogon monspeliensis*, Koch, Smith, Hooker, Lindley. *Alopecurus monspeliensis*, Linn. *Agrostis triaristata*, Knapp.

each glume furnished with a long, slender, rough awn, arising immediately beneath the summit. *Floret* of two paleæ, (Fig. 2), the outer palea about half the length of the calyx, of an ovate form, without lateral ribs; tipped with a small awn about half the length of the palea. *Inner palea* rather shorter than the outer palea, thin and pellucid, with the margins entire.

Obs.—This species is readily distinguished from every other British grass by the great length of the awns of the glumes.

This grass has been applied to no agricultural use. It is rare in Scotland, found only on the Fifeshire coast. In England it occurs along the coasts of Durham, Gloucester, Norfolk, Essex, Kent, and Hants. It has not been discovered either in Ireland or America. It is frequent along the Mediterranean, but does not exist further north than latitude 55°.

Flowers early in July, and ripens its seed in the second week of August.

20. Agrostis vulgaris.*

Fine Bent-Grass.

Specific Characters.—Floret of two paleæ. Ligule short and obtuse. Sheaths smooth. (Plate XII.)

Description.—The usual height about fifteen inches. The root is perennial, tufted, somewhat creeping. *Stem* erect, round, smooth, and polished; bearing five or six leaves with smooth striated sheaths; the upper sheath rather longer than its leaf, crowned with a short obtuse membranous ligule. *Joints* smooth. *Leaves* rather short, flat, narrow, acute, rough on both surfaces, the edges minutely toothed. *Inflorescence* compound panicled. *Panicle* erect, of a brownish purple, sometimes pale green, the branches very delicate, slender, rough, spreading zig zag, arising from the rachis in three or fours at equal distances. *Spikelets* small, numerous, glossy, of one small awnless floret, shorter than the calyx. *Calyx* of two narrow acute glumes, (Fig. 1), nearly of equal size, without lateral ribs, the larger glume the lowermost, minutely toothed on the upper half of the keel. *Floret*

* *Agrostis vulgaris*, Withering, Smith, Hooker, Lindley, Greville, Koch.

of two paleæ, (Fig. 2) the outer palea ovate, minutely notched at the summit without lateral ribs, smooth at the base. *Inner palea* about half the length of the outer palea, membranous, with the margins entire.

—— —— *pumila*, (Plate XII.) a very small variety, from two to three inches long; the *root* much tufted, throwing out three or four somewhat procumbent stems; *ligule* very short and obtuse; *sheaths* smooth. Common on dry alpine situations; flowering in July and August.

—— —— *aristata*, (Plate XIII.) a variety growing to the height of fifteen inches. The *leaves* rough; *sheaths* smooth; *ligule* short and obtuse, but rather more prominent than in *Agrostis vulgaris*. *Outer palea* with a long slender dorsal awn arising a little above the base, (Fig. 2), and extending conspicuously beyond the glumes of the calyx. Sometimes the awn is very short, scarcely perceptible, as seen in (Fig. 4.) *Inner palea* very thin, about half the length of the outer palea, furnished at the base with a tuft of short hairs. Care must be taken so as not to mistake this grass for *Agrostis canina*, whose floret has but one palea, and the ligule is long and pointed.

Agrostis vulgaris is distinguished from *Agrostis alba* in the *sheaths* of the leaves being smooth to the touch; the *ligule* short and obtuse, and the *large glume* of the calyx toothed only on the upper part;—whereas in *A. alba* the *sheaths* are rough (distinctly felt by passing the finger from above downwards, but smooth in the opposite direction.) The *ligule* long and acute, and the *large glume* of the calyx toothed nearly to the base.

This grass is said to be disliked by cattle generally, and is not of sufficient importance to merit the attention of agriculturists. It grows on dry heaths and pastures, sometimes at an elevation of nearly 2000 feet above the sea.

It is common throughout England, Ireland, and Scotland; is found in Lapland, Norway, Sweden, Denmark, Germany, France, Italy, and Northern Africa. It also occurs in America as far north as latitude 72.

Flowers in the first week of July, and ripens its seed in the second week of August.

21. Agrostis alba. *

Marsh Bent-Grass.

Specific Characters.—Floret of two paleæ; ligule long and acute; sheaths rough. (Plate XIII).

Description.—It grows from eighteen inches to two feet high. The root is perennial, tufted, somewhat creeping. *Stem* erect, round, smooth, and polished; bearing four or five leaves with *roughish* striated sheaths, (the roughness is felt only from above downwards, sometimes scarcely perceptible,) upper sheath longer than its leaf, crowned with a *long acute* ragged ligule, slightly ribbed at the sides. *Joints* smooth. *Leaves* rather short, flat, narrow, acute, very rough on both surfaces, as well as on the edges. *Inflorescence* compound panicled. *Panicle* erect, of a purplish tinge, with light-green florets, the branches rough, slender, when in flower, spreading, arising from the rachis mostly in fives, of various lengths, placed at equal distances; the lowermost branches more or less tufted. *Spikelets* numerous, small, erect, of one small awnless floret, concealed within the calyx. *Calyx* of two narrow acute glumes, (Fig. 1), nearly of equal size, without lateral ribs; the larger glume the lowermost, *minutely toothed its whole length.* *Floret* of two paleæ, (Fig. 2); the outer palea, ovate, minutely notched at the summit, without lateral ribs, furnished at the base with a small tuft of short hairs. *Inner palea* about half the length of the outer palea, cloven at the summit, pellucid, the margins entire.

—— —— *stolonifera*, (Plate XIV). a variety with the branches of the panicles densely tufted. *Sheaths* roughish. *Ligule* long. *Stem* procumbent at the base. *Root* creeping, throwing out long procumbent smooth stems, which take root at their joints. Frequently found by the sides of ditches and wet places, and also on clayey soil near the sea. Flowering in July and August.

—— —— *palustris*, (Plate XIV). a variety with larger spikelets than usual. *Outer palea* awned a little beneath the summit, and furnished with a small tuft of hairs at the base. *Ligule* long and pointed. *Sheaths* roughish. Commonly met with in damp shady stagnant places. Flowering in July and August.

* *Agrostis alba*, Linn. Smith, Hooker, Greville, Lindley. *Agrostis stolonifera*, Koch.

Obs.—*Agrostis alba* is distinguished from *Agrostis vulgaris* in the *sheaths* being rough to the touch; *ligule* long and acute, and the *keel* of the large glume of the calyx toothed nearly to the base;—whereas in *A. vulgaris* the *sheaths* are smooth. *Ligule* very short and obtuse, and the keel of the large glume of the calyx toothed only on the upper part.

From *Agrostis canina*, in the floret having an inner palea, whilst in *A. canina* the inner palea is wanting.

Farmers generally consider this grass a troublesome weed, as its long creeping roots impoverish the soil. It is eaten by cattle, but they are not fond of it. It grows in meadows, pastures, and dry sandy ground, and sometimes attains the elevation of nearly 2000 feet above the sea.

Flowers in the third week of July, and ripens its seed in the end of August.

22. Agrostis canina.*

Brown Bent-Grass.

Specific Characters.—Floret of one palea. Ligule long. Sheaths smooth. (Plate XV.)

Description.—It grows from one to two feet high. The root is perennial, creeping. *Stem* erect, slender, slightly decumbent at the base, round, smooth, and glossy; bearing four or five leaves with perfectly smooth sheaths; the upper sheath much longer than its leaf, crowned with a long membranous pointed ligule. *Joints* smooth. *Leaves* narrow, taper-pointed, those of the root setaceous, rough on both surfaces, and serrated at the edges. *Inflorescence* compound panicled, of a greenish or yellowish-brown. *Panicle* erect, spreading while in flower, otherwise close; the branches very delicate, elastic, rough, with minute teeth; arising from the rachis mostly in threes or fives. *Spikelets* numerous, small, acute, on footstalks about the length of the glumes; of one awned floret concealed within the calyx. *Calyx* of two unequal acute glumes, (Fig. 1), the outer glume the larger, without lateral ribs, toothed the whole length of its keel. *Floret* of

* *Agrostis canina*, Linn. Smith, Hooker, Greville, Koch. *Trichodeum caninum*, Lindley, Schrader.

one palea, (Fig. 2), of an ovate form, five-ribbed, minutely toothed at the summit, slightly hairy at the base, furnished with a long dorsal awn arising from a little above the base, and extending half its length beyond the summit of the palea. On some occasions the awn is very short, (Fig. 6.)

—— —— *alpina*, (Plate XV.) a small alpine variety from two to three inches in length, differing in no respect whatever, except in size, from the *Agrostis canina* already described. *Agrostis alpina* of Koch. This variety is found in the Isle of Arran, on the summit of Ben Lawers, and the Clova mountains. Flowering in July and August.

For agricultural purposes this grass is comparatively of no value. It grows chiefly on poor, wet, peaty soil, in small detached patches, seldom combined with any other species of grass.

It is common in England, Scotland, and Ireland, as well as in Sweden, Denmark, Germany, France, and Italy. Frequent in America, but is stated to have been introduced from Europe.

23. Calamagrostis stricta. *

Small Close Reed.

Specific Characters.—Awn arising from below the centre of the outer palea. Hairs not longer than the floret. (Plate XVI.)

Description.—It grows from eighteen inches to two feet high. The root is perennial, creeping. *Stem* erect, round and slightly roughish; bearing two or three leaves with smooth striated sheaths; the upper sheath longer than its leaf, crowned with a *very small ligule*. *Joints* smooth. *Leaves* narrow, acute and roughish. *Inflorescence* compound panicled. *Panicle* from three to five inches long, rather close; branches and rachis rough. *Calyx* of two nearly equal *rather broadish* membranous glumes, (Fig. 1), without lateral ribs; roughish on the back; containing one awned floret. *Floret* of two paleæ, (Fig. 2), *the outer palea equal in length to the calyx*, of an ovate form, jagged at the summit, furnished at the base with long, straight hairs

* *Calamagrostis stricta*, Koch, Lindley, Hooker. *Arundo stricta*, Smith, Hooker, *Fl. Scot.*

not reaching beyond the summit of the floret. *Awn* arising from a little below the centre of the outer palea, and *not projecting beyond the summit of the palea. Inner palea* thin and pellucid, much shorter than the outer palea.

Obs.—*Calamagrostis stricta* is distinguished from *Calamagrostis Epigegos* in being a much more delicate plant; *florets* about half the size; *hairs* from the base of the floret not extending beyond the floret; *awn* arising from rather below the centre of the outer palea and scarcely extending beyond the palea;—whereas in *C. Epigegos*, the hairs extend considerably beyond the floret. *Awn* arising from rather above the centre of the outer palea, and projecting nearly half its length beyond the palea.

This very rare plant is now extinct in Britain. It was found several years ago by the late Mr G. Don in White Mire Marsh, one mile from Forfar. It is a native of the most northern parts of Europe and North America.

Flowers in the third week in June and ripens its seed in the end of July.

24. Calamagrostis Epigegos.*

Wood Reed.

Specific Characters.—Awn arising from a little above the centre of the outer palea. Hairs much longer than the floret. (Plate XVI.)

Description.—It grows from three to five feet high. The root is perennial, creeping. *Stem* round, erect, rough (when felt from above downwards); bearing four leaves with smooth striated sheaths; the upper sheath longer than its leaf; crowned with a long lanceolate divided ligule. *Joints* smooth. *Leaves* narrow, acute, taper-pointed, rough on the inner surface and edges; smooth on the back. *Inflorescence* compound panicled, of a brownish tinge. *Panicle* erect, close both before and after flowering, about a span in length; branches rough, arising in alternate clusters at certain distances along the round rough rachis. *Calyx* of two equal *narrow* acute glumes,

* *Calamagrostis Epigegos*, Lindley, Koch, Hooker. *Arundo Epigegos*, Smith. *Arundo calamagrostis*, Hooker, *Fl. Scot.* Lightfoot.

(Fig. 1), without lateral ribs, roughish towards the points; containing one-awned floret *shorter* than the glumes. *Floret* of two paleæ, (Fig. 2), the outer palea ovate-lanceolate, without lateral ribs, terminating in *two biffid points*, furnished at the base with a number of long straight white hairs, *equal in length to the calyx*. *Awn* long and slender, arising from about the *centre* of the palea, and extending as high as the summit of the hairs. *Inner palea* linear, membranous, acute, much shorter than the outer palea.

Obs.—*Calamagrostis Epigegos* is distinguished from *Calamagrostis stricta* in the *hairs* of the floret extending about one-third their length beyond the floret, and the *awn* arising from a little above the centre of the outer palea, and projecting nearly half its length beyond the palea;—whereas in *C. stricta* the hairs and awn scarcely extend beyond the floret.

This grass possesses no agricultural merits of any importance. Cattle seldom touch it. It grows in moist woods and shady ditches. Frequently met with in the central parts of Scotland. In England it is found in Northumberland, Durham, Cumberland, York, Lincoln, Nottinghamshire, Anglesea, Salop, Worcester, Warwick, Leicester, Oxford, Bedford, Cambridge, Norfolk, Suffolk, Essex, Middlesex, Surrey, Kent, Sussex, Dorset, and Somerset. Occasionally found in Ireland. It is also a native of Lapland, Norway, Sweden, Denmark, and Germany, but in America it is unknown.

Flowers in the end of July, and ripens its seed about the last week in August.

25. Anemagrostis Spica venti. *

Silky Bent-Grass.

Specific Character.—Awn arising from a little below the summit of the outer palea, and more than three times the length of the palea. (Plate XVII.)

Description.—It grows from eighteen inches to two feet high. The root is annual, fibrous. *Stem* erect, smooth, and round; bearing five leaves with somewhat roughish sheaths; the upper sheath longer

* *Anemagrostis Spica venti*, Lindley. *Agrostis Spica venti*, Koch, Hooker, Smith.

than its leaf, crowned with a long lanceolate jagged ligule. *Joints* naked. *Leaves* narrow, spreading, acute, ribbed, rough on both surfaces. *Inflorescence* compound panicled, loose, spreading. *Panicle* large, silky in appearance, leaning to one side and elegantly waving with the wind; its branches slender, rough, finely subdivided, arranged in alternate bundles, the middle branch being the largest; rachis mostly smooth and polished. *Spikelets* numerous, small, of one-awned floret equal in length to the calyx. *Calyx* of two unequal acute glumes, (Fig. 1), rough on the keels, the large glume the uppermost, three-ribbed. *Floret* of two paleæ, (Fig. 2), the outer palea of an ovate-lanceolate form, roughish, faintly three-ribbed, furnished with a tuft of hairs at the base. *Awn* rough, long, and slender, arising from a little below the summit, *more than three times the length of the palea*. *Inner palea* linear, membranous, rather shorter than the outer palea, biffid at the summit, the margins entire. *Seeds* very smooth.

Obs.—The great length of the awn compared with the length of the floret will readily distinguish this grass. It is separated from the genus *Agrostis* in the lower glume being smaller than the upper glume, whilst in *agrostis* the lower glume is the largest.

This is one of the rarest grasses we have in Scotland; found only on the Fifeshire coast. In England, it is met with in Northumberland, Durham, Cumberland, Lancashire, York, Warwick, Berks, Beds, Cambridge, Norfolk, Suffolk, Essex, Herts, Middlesex, Surrey, and Kent, but unknown in Ireland. It is a native of the middle and south of Europe. It has not been discovered either in Lapland, Norway, or Sweden, and no mention is made of its existence in America. It grows in light, sandy soil, especially when it is occasionally overflowed. Flowers in June and July.

26. Milium effusum.*

Spreading Millet Grass.

Specific Characters.—Branches of the panicle loose, spreading, (Plate XVII.)

* *Milium effusum*, Linn. Smith, Hooker, Lindley, Greville, Koch.

Description.—It grows from three to four feet high. The root is perennial, fibrous, with several creeping shoots. *Stem* erect, smooth, slender, glossy, bearing five or six leaves with smooth striated sheaths; the upper sheath crowned with an oblong membranous ligule. *Joints* smooth. *Leaves* broad, flat, acute, of a light-green, glossy and smooth on both surfaces except towards the upper part, which is roughish as well as the edges. *Inflorescence* compound panicled. *Panicle* erect, large, loose, spreading; the branches long and slender, arising in alternate clusters at certain distances along the smooth rachis. *Spikelets* numerous, small, ovate, on slender roughish footstalks; of one awnless floret, concealed within the calyx. *Calyx* of two equal broad membranous glumes (Fig. 1), roughish, three-ribbed. *Floret* of two paleæ, (Fig. 2), the outer palea smooth, membranous, glossy, without any perceptible ribs or keel. *Inner palea* about the same length as the outer palea, membranous, with the margins entire.

Obs.—The large loose spreading panicle, with small one floret spikelets, will readily distinguish this grass, independent of the more minute characters.

There appears to be but little nutritive properties in the foliage of this grass to render it of any agricultural advantage. The seeds are much sought after by small birds, and where game is preserved, this grass is recommended to be encouraged to save the corn. It grows naturally in damp shady woods, and will thrive when transplated in open exposed situations.

It is common in many parts of Scotland as well as in England and Ireland. Found also in Lapland, Norway, and Sweden, and as far south as the Mediterranean. It also occurs in the United States, to the most northern parts of North America.

Flowers in the second and third weeks of June, and ripens its seed in the second week of August.

27. Melica uniflora.*

Wood Melic-Grass.

Specific Characters.—Infloresence simple panicled. Calyx containing but one perfect floret. (Plate XVIII.)

Description.—It grows from twelve to eighteen inches high. The root is perennial, creeping. *Stem* erect, round, slender, roughish on the upper part, bearing four or five leaves, with rough striated sheaths; the upper part of the sheaths furnished with a few slender white hairs; upper sheath shorter than its leaf, crowned with a short obtuse membranous ligule with a small slender point or bristle projecting from one side. *Leaves* long, flat, thin, of a bright green, acute, flaccid, finely striated, roughish on both surfaces as well as on the edges. *Inflorescence* simple panicled. *Panicle* slightly drooping, with few spikelets on long, slender, roughish footstalks; the branches long, slender, arising from the rachis usually in pairs. *Spikelets* erect, of an ovate form, of one perfect and one imperfect awnless floret, concealed within the calyx. *Calyx* of two rather unequal smooth glumes, (Fig. 1), tinged with reddish-brown, five-ribbed, the lower glume the smaller. *Floret* of two paleæ, (Fig. 2), the outer palea broad, obtuse, smooth, seven-ribbed. *Inner palea* broad, oval, rather shorter than the outer palea, with two green marginal ribs minutely fringed. The imperfect floret on a long smooth footstalk, not extending beyond the lower floret.

Obs.—Melica uniflora is distinguished from *Melica nutans* in the panicle being branched; the lower spikelets on long footstalks; *calyx* containing but *one* perfect floret and an abortive one;—whereas in *M. nutans* all the spikelets arise immediately from the rachis on short footstalks all nearly of equal length. *Calyx* containing *two* perfect florets and an abortive one.

The most natural place of growth of this grass is in rocky moist shady woods having a clayey soil, situated about 300 feet above the sea. It is frequent in England, Ireland, Scotland, Germany, France, and Italy. It has not been found in America, or further north than

* *Melica uniflora*, Linn. Smith, Hooker, Greville, Lindley, Koch.

latitude 62. Its limit of altitude seems to be about 1500 feet above the sea.

Flowers in the second week of June, and ripens its seed in the last week of July. Cattle are fond of the leaves.

28. Melica nutans.*

Mountain Melic-Grass.

Specific Characters.—Inflorescence racemed. Calyx containing two perfect florets. (Plate XVIII.)

Description.—It grows from twelve to eighteen inches high. The root is perennial, creeping. *Stem* erect, slender, roughish on the upper part, bearing four or five leaves with rough striated sheaths; upper sheath shorter than its leaf, crowned with a very short, obtuse ligule. *Leaves* long, narrow, acute, flaccid, of a light green, smooth on the back, slightly hairy on the inner surface, and rough towards the points. *Inflorescence* racemed. *Raceme* long, usually of ten spikelets, on short, rough footstalks. *Spikelets* large, ovate, pendulous, of two perfect, and one imperfect floret. *Calyx* of two broad rather unequal glumes (Fig. 1), of a reddish-brown, smooth, five-ribbed; the lower glume the smaller. *Florets* of two paleæ, (Fig. 2), the outer palea of lowermost floret equal in length to the glumes; broad, obtuse, seven-ribbed, smooth. *Inner palea* broad, obtuse, with two green marginal ribs delicately fringed. Second floret elevated on a short smooth footstalk, but similar in other respects to the floret below. The third or imperfect floret of an oval form situated on a long smooth pedicle, not projecting beyond the calyx.

Obs.—This grass is distinguished from *Melica uniflora* in the inflorescence being racemed, and the calyx containing two perfect florets; —whereas in *M. uniflora* the inflorescence is simple panicled, and the calyx contains but one perfect floret.

This grass is found most generally in rather damp shady woods, of an altitude of 500 feet above the sea, its limit being 2000 feet. In Scotland it is not frequent; found in Aberdeenshire, Forfarshire, Fifeshire, and near Edinburgh. In England it is met with in Northum-

* *Melica nutans*, Linn. Smith. Hooker, Greville, Lindley, Koch.

berland, Durham, Cumberland, Westmorland, York, Nottinghamshire, Derby, Cheshire, Denbigh, Worcester, Suffolk, and Herts. Has not been found in Ireland or America. It occurs in Lapland, Norway, Sweden, Denmark, Germany, France, and Italy.

Flowers in the last week of May, and ripens its seed in July.

From the early growth of this grass, and its thriving well in open situations when cultivated, it proves worthy of agricultural notice.

29. Airochloa cristata.*

Crested Hair-Grass.

Specific Characters.—Outer palea three-ribbed, stem downy. (Plate XIX.)

Description.—It grows from three to six inches high. The root is perennial, with long, downy fibres, forming dense tufts. *Stem* erect, occasionally curved, round, downy, especially towards the upper part; bearing two or three leaves, with hairy, striated sheaths; the upper sheaths longer than its leaf, crowned with a short obtuse jagged ligule. *Joints* smooth, situated near the base. *Leaves* narrow, acute, rather stiff, roughish, downy on both surfaces, the edges rough and more or less hairy; the ribs more prominent on the inner surface, except the central rib, which is more conspicuous behind. *Inflorescence* simple panicled, dense, of a silvery hue. *Panicle* erect, from one to two inches long, of an oval form, interrupted at the lower part; the branches short, downy, arranged on the rachis in pairs, spreading when in flower, close and compact both before and after flowering. *Spikelets compressed, of two awnless florets, not projecting beyond the glumes of the calyx. Calyx* of two rather unequal acute glumes (Fig. 1), minutely toothed on the keels, the upper glume three-ribbed. *Florets* of two paleæ, (Fig. 2), the outer palea of lowermost floret acute, three-ribbed, minutely toothed on the central rib. *Inner palea* about equal in length to the outer palea, cloven at the summit, and delicately fringed at the margins. Second floret elevated on a long downy footstalk; rather smaller than the floret below, but similar to it in every other respect.

* *Airochloa cristata*, Link, Lindley. *Aira cristata*, Smith, Hooker, Greville. *Koeleria cristata*, Koch.

Obs.—*Airochloa cristata* is distinguished from *Aira*, in which genus it is placed in the British Flora, in the florets having no awns, and not hairy at the base.

This grass, from its rather stiff pubescent leaves, is supposed to be the principal cause why cattle seldom eat it. Its nutritive properties being as great as in most other grass. It is found in pastures of dry soil, especially near the sea, and on rocks of an elevation of 1500 feet above the sea. It is frequent in England, Scotland, and Ireland, as well as in Germany, France, and Italy. It has not been found in Lapland or North America.

Flowers in the third week of June, and ripens its seed about the end of August.

30. Molinea depauperata.*

Tawny Melic-Grass.

Specific Character.—Outer palea five-ribbed. (Plate XIX.)

Description.—It grows from nine to twenty inches high. The root is perennial, of many strong yellowish fibres. *Stem* erect, round, smooth, bulbous at the base, bearing three leaves with smooth striated sheaths; the upper sheath shorter than its leaf, crowned with a very short, almost imperceptible ligule. *Joint* smooth, situated very near the base. *Leaves* long, extending beyond the panicle, acute, smooth on the lower half, roughish upwards, hairy on the inner surface. *Inflorescence* simple panicled. *Panicle* erect, thin, few-flowered, close; the branches roughish and slender, arising from the angular rachis, mostly solitary, seldom in pairs. *Spikelets* erect, of a bleached appearance, on long footstalks, of one awnless floret, sometimes the rudiment of a second. *Calyx* of two membranous unequal acute glumes, (Fig. 1), without lateral ribs. *Floret* of two palea, (Fig. 2,) the outer palea much longer than the glumes, acute, smooth, *five-ribbed*, the marginal ribs the broadest. *Inner palea* about equal in length to the outer palea, with two prominent ribs not fringed.

* *Molinea depauperata*, Lindley.

Obs.—This grass is a well-marked species, and is readily distinguished from *Melinea cærulea* in the *leaves* of the stem extending beyond the panicle. *Panicle* thin, few-flowered, colourless; *calyx* containing but one floret; *outer palea* five-ribbed;—whereas in *M. cærulea*, the *leaves* do not extend beyond the panicle; *panicle* many-flowered, of a purplish or greenish tinge; *calyx* containing two or more florets; *outer palea* three-ribbed.

The only locality as yet known for this grass is the Clova mountains, at an elevation of 3000 feet above the sea. First discovered by Mr Donald Munro. It flowers in August.

31. Molinea cærulea.*

Purple Melic-Grass.

Specific Character.—Outer palea three-ribbed. (Plate XX.)

Description.—It grows from one to two feet or more high. The root is perennial, of many strong fibres. *Stem* erect, smooth, round, bulbous at the base, bearing about three leaves, with smooth striated sheaths; the upper sheath shorter than its leaf, crowned with a very small ligule. *Joint* smooth, situated very near the base. *Leaves* long, linear, narrow, acute, taper-pointed, rough on both surfaces on the upper part; smooth below, besprinkled with hairs on the inner surface. *Inflorescence* compound panicled. *Panicle* erect, long, narrow, and close; the branches slender, roughish, wavy, arising in tufts, alternately, at certain distances along the angular ribbed slightly wavy rachis. *Spikelets* small, numerous, mostly of two, sometimes three awnless florets, much longer than the glumes, generally of a purplish tinge; in shady places of a light green. *Calyx* of two unequal acute glumes (Fig. 1), smooth, three-ribbed (sometimes the lateral ribs are wanting). *Florets* of two paleæ, (Fig. 2), the outer palea of lowermost floret acute, three-ribbed, smooth. *Inner palea* equal in length to the outer palea, furnished with two prominent green marginal ribs not fringed. Second floret elevated on a long, rough footstalk, but in other respects similar to the floret below.

* *Molinea cærulea*, Lindley, Koch. *Melica cærulea*, Linn. Smith, Hooker, Greville. *Aira cærulea, Linn.*

Obs.—In Orkney and Shetland Isles, the stems of this grass are manufactured by fishermen into ropes; and in England, the country people make them into brooms, which they sell at a cheap rate. This grass is comparatively of no agricultural value, as cattle seldom eat it. It grows on damp heathy places, and moors, and on the confines of peat-bogs, and is abundant in Scotland, England, and Ireland. It is found in Lapland, Norway, and Sweden, to the most southern parts of Europe. It has not been discovered in America.

Flowers in the third week of July, and ripens its seed about the end of August. Its limit of altitude seems to be about 1500 feet above the sea.

32. Catabrosa aquatica.*

Water Hair-Grass.

Specific Character.—Leaves broadly linear, obtuse. (Plate XX.)

Description.—It grows from one to two feet in length. The root is perennial, creeping, often floating, with long, white, shining fibres. *Stem* stout, round, smooth, procumbent at the base to a considerable length, often bearing three or four leaves, with smooth striated sheaths; the upper sheath *shorter* than its leaf, crowned with an obtuse membranous ligule. *Joints* smooth. *Leaves* flat, broadly linear, obtuse, smooth, flaccid, of a light green. *Inflorescence* compound panicled. *Panicle* erect, the branches spreading, arranged on the smooth rachis in half whorls, generally three or four of unequal lengths arising from the same base, ultimately becoming reflexed. *Spikelets* numerous, rather small, pendulous, *of two awnless florets* much longer than the glumes, projecting one beyond the other. *Calyx* of two membranous very unequal obtuse glumes, (Fig. 1), roughish on the keel and sides; without lateral ribs; the lower glume much the smaller. *Florets* of two paleæ, (Fig. 2), the outer palea of lowermost floret *three-ribbed*, notched at the summit, smooth at the keel. *Inner palea* about equal in length to the outer palea; linear, cloven at the summit, and furnished with two green marginal ribs not fringed. Second floret elevated on a long smooth footstalk, but similar in other respects to the one below.

* *Catabrosa aquatica*, Hook. Lindley. *Aira aquatica*, Smith, Hooker, *Fl. Scot.* Greville.

Obs.—*Catabrosa aquatica* has been frequently confounded with *Poa aquatica*, (Plate XLIV.) but is readily distinguished by many characters; the most prominent, however, are in the branches of the panicle, rachis, sheaths of leaves being perfectly smooth to the touch. *Calyx* containing but two florets;—whereas in *P. aquatica* the branches of the panicle, rachis, sheaths of leaves are very rough to the touch, and the *calyx* contains from four to eight florets.

This species is said to be one of the sweetest of the British grasses, the young leaves and portions of the stems being remarkably sweet and pleasant to the taste, resembling that of liquorice. Water-fowls are fond of the seeds and young shoots. Cattle eat the leaves with a relish, but as the plant is strictly an aquatic, found to exist only in wet or muddy pools, in ditches, and such like places, render it unfit for cultivation.

It is frequent in Scotland, England, and Ireland. It is found also in Lapland, Norway, Sweden, Germany, France, and Italy, as well as in the northern parts of South America. It has not been discovered in the United States. Its limit of altitude seems to be about 500 feet above the sea. It flowers in the second week of July, and ripens its seed in the middle of August.

33. Holcus lanatus. *

Meadow Soft-Grass.

Specific Characters.—Awn with the two lower thirds perfectly smooth. (Plate XXI.)

Description.—It grows from one to two feet high. The root is perennial, fibrous. *Stem* erect, round, *scarcely smooth*, bearing four or five leaves with *soft downy sheaths;* the upper sheath much longer than its leaf, inflated, crowned with an obtuse, membranous ligule; the lower sheaths shorter than their leaves. *Joints* usually four, occasionally naked, but more frequently covered with soft downy hairs, with their points directed downwards. *Leaves* of a pale green, flat, broadish, acute, *soft on both surfaces, being covered with slender delicate hairs.* *Inflorescence* compound panicled, of a greenish reddish

* *Holcus lanatus*, Linn., Smith, Hooker, Greville, Lindley, Koch.

or pinkish tinge. *Panicle* erect, usually somewhat of a triangular form; spreading, (in the young state close), the branches hairy, arising from the rachis alternately in pairs of unequal lengths. *Spikelets* pendulous, with hairy peduncles; of two florets, the upper one awned. *Calyx* of two *hairy* membranous glumes (Fig. 1), of equal height, the upper glume the larger, *of an oblong form, tipped with a minute bristle, hairy on the keel and upper part of the inner margins*, furnished with a green rib on each side; lower glume somewhat crescent-shaped, hairy on the keel and upper part of the inner margins, without lateral ribs. *Florets* of two paleæ (Fig 2); the outer palea of lowermost floret of an oval form, about half the length of the calyx, obscurely five-ribbed, obtuse at the summit, hairy at the base, with a long naked footstalk. *Inner palea* about equal in length to the outer palea, membranous, obtuse, with the margins delicately fringed. Upper floret smaller than the lower one, elevated on a long naked footstalk; furnished with a dorsal awn about half the length of the palea, arising from a little beneath the summit, and when ripe, curved in the form of a fish hook, becoming concealed within the calyx; sometimes the awn, during the early stage, projects conspicuously beyond the calyx, *its summit is slightly roughish, but the two lower thirds are perfectly smooth.*

Obs.—Holcus lanatus is distinguished from *Holcus mollis* in many respects, which are best seen by comparing the descriptions; but the most simple and constant character is derived from the *awn* of the uppermost floret, which, in *H. lanatus*, is roughish at the summit, with the *two lower thirds perfectly smooth*, while in *H. mollis* it is minutely toothed throughout its whole length, which can be readily seen by the assistance of a lens, (See Plate XXI. Fig. 2.). The unprotruded curved awn in *H. lanatus* is considered a good specific distinction by most authors, but in the flowering stage of the plant the awn is not curved, and protrudes slightly beyond the calyx, as in *H. mollis*, and becomes curved only as the seeds approach to maturity.

The only advantages that this grass possesses are in its being productive and easy of cultivation. It has no merits either for pasture or hay, as cattle of every kind seem to dislike it, especially horses. It is a very common grass on shady banks; in woods and

moist pastures, but attains to the greatest degree of luxuriance on light moist soils of a peaty nature. It is met with in almost every county throughout Britain. Not found in Lapland. Common in Germany, France, and Italy. Said to have been introduced into America. Its limit of altitude about 1500 feet above the sea.

Flowers in the first week of July, and ripens its seed about the end of the same month.

34. Holcus mollis.*

Creeping Soft-Grass.

Specific Characters.—Awn rough throughout its whole length. (Plate XXI.)

Description.—It grows from one to three feet high. The root is perennial, creeping. *Stem* erect, round, and *smooth*, bearing four or five leaves with generally smooth sheaths; the upper sheath much longer than its leaf, inflated, crowned with an obtuse membranous ligule; the lower sheaths shorter than their leaves. *Joints* usually four, covered with fine delicate hairs pointing downwards. *Leaves* of a pale green, flat, broadish, acute, slightly roughish and soft to the touch on both surfaces. *Inflorescence* compound panicled, soon becoming of a bleached appearance. *Panicle* erect, when large, slightly drooping at the summit; the branches spreading, hairy, arising from the rachis alternately, in pairs of unequal lengths. *Spikelets* mostly ascending, with hairy peduncles; of two florets, the upper one awned. *Calyx* of two membranous glumes of equal lengths, (Fig 1), acute, hairy on the keels, roughish on the sides; the upper glume the larger, three-ribbed; the lower glume without lateral ribs. *Florets* of two paleæ, (Fig. 2); the outer palea of lowermost floret of an oval form, about half the length of the calyx, without lateral ribs, obtuse at the summit, with three long delicate hairs at the base, and a long naked footstalk. *Inner palea* about equal in length to the outer palea, membranous, obtuse, with the margins delicately fringed. Upper floret smaller than the lower one, elevated on a long naked footstalk, furnished at the base with a tuft of white hairs; from a little below the summit arises a long awn about equal in length to the palea,

* *Holcus mollis*, Linn. Smith, Hooker, Greville, Lindley, Koch.

rough throughout its whole length, protruding at all times conspicuously beyond the calyx, when dry becoming bent but never curved; in other respects, the upper floret is similar to the lower one.

Obs. —— —— *biaristatus,* (Plate XXII.) This variety, when compared with *Holcus mollis,* has larger and fewer spikelets, generally of a bleached appearance; the ligule longer; the florets nearly of equal size, as long as the small glume of the calyx; acute at the summits, *both* furnished with a *long dorsal awn,* rough throughout the whole length. *Root* creeping. At first I was led to consider this grass as a distinct species (in consequence of finding the awns constant in all those specimens I examined), and stated it as such at a meeting of the Royal Society of Edinburgh; but having since had an opportunity of examining several dozen specimens from various localities, and not finding the characters constant throughout all the florets of the same panicle, I am induced to consider it as only a variety of *H. mollis.* In some specimens the spikelets on the upper part of the panicle have both their florets distinctly awned, while the florets of the lower spikelets are similar in every respect to those of *H. mollis.* This variety is frequently met with in damp shady woods, and occasionally in open boggy situations. It flowers early in July.

—— —— *parviflorus,* (Plate XXII.) a variety from nine to twelve inches high, with very small spikelets of the size represented in the figure, being not more than half the size of those of *Holcus mollis.* Flowers early in July, and is found in dry sandy woods.

Holcus mollis is distinguished from *Holcus lanatus* (two species very closely allied), in the large glume of the calyx being acute; the *lateral rib* situated nearer to the keel than to the inner margin. *Awn* of the floret minutely toothed its *whole* length, (see Fig. 4);—whereas in *H. lanatus* the large glume is more obtuse, tipped with a minute point or awn; *lateral rib* situated nearer the inner margin than to the keel; *awn* of the floret perfectly smooth nearly its whole length, and being roughish only on the upper third. (See Fig. 4).

This grass is considered by farmers as a most troublesome weed, and with difficulty eradicated, especially when it gets possession of a soil that is favourable to its growth. Its long creeping root, which is said sometimes to exceed the length of four feet, is very impoverish-

ing to the soil. It grows generally on light barren sandy soil, either in woods or open pastures, but neither cows, horses, or sheep eat it. Pigs are said to be fond of the roots, which possess a considerable quantity of nutritive matter, having very much the flavour of new meal. It is a common grass in some districts, but not so frequent as *Holcus lanatus*. Found in most of the counties in Britain. Not known in Lapland or America. Occurs in Sweden, Denmark, Germany, France, and Italy. Its limit of altitude about 1500 feet above the sea.

Flowers in the second week in July, and ripens its seed in August.

35. Aira cæspitosa.*

Tufted Hair-Grass.

Specific Characters.—Awn arising from a little above the base of the floret, and scarcely extending beyond the jagged summit. (Plate XXIII.)

Description.—It grows from eighteen inches to three feet high. The root is perennial, fibrous, tufted. *Stem* erect, round, roughish, bearing four or five leaves with mostly roughish striated sheaths; the upper sheath much longer than its leaf, crowned with a long acute membranous ligule. *Joints* smooth. *Leaves* narrow, acute, harsh, strongly ribbed, roughish on both surfaces, but more so on the inner surface; radical leaves mostly long, linear and narrow, sometimes folded or involute. *Inflorescence* compound panicled, of a silky greenish grey, sometimes of a brownish tinge. *Panicle* large, at first drooping, afterwards erect, the branches spreading in every direction, rachis and branches rough. *Spikelets* numerous, small, of two or three awned florets, the upper one extending a little beyond the calyx. *Calyx* of two acute nearly equal glumes (Fig. 1); the upper glume three-ribbed, roughish on the central rib; the lower glume without lateral ribs. *Florets* of *two paleæ*, (Fig. 2), the outer palea of lowermost floret shorter than the glumes, membranous, *jagged or four-toothed on the summit*, hairy at the base, without lateral ribs, furnished with a slender *awn* arising from a *lit-*

* *Aira cæspitosa*, Linn. Smith, Hooker, Greville. *Deschampsia cæspitosa*, Lindley.

tle above the base, and extending scarcely above the summit of the palea. Inner palea membranous, linear, and entire at the margins, rather shorter than the outer palea. Second floret elevated on a hairy pedicle, and rather smaller than the lower floret, but similar to it in every other respect.

—— —— *vivipera*, a viviparous variety occasionally found on the Clova mountains.

Obs.—*Aira cæspitosa* is at all times readily distinguished from *Aira alpina* in the *awn* arising from a little above the base of the outer palea;—whereas in *A. alpina*, the *awn* arises from a little above the *centre* of the outer palea. (See Plate XXIII. Fig. 2.)

From *Aira flexuosa*, in the awn of the lower floret not protruding beyond the glumes of the calyx;—whereas in *A. flexuosa* the awn of the lower floret protrudes more than one-third its length beyond the glumes. (See Plate XXIV. Fig. 2.)

This grass has a most unsightly appearance in meadows, pastures, and parks, as it grows into large tufts, and forming irregularities on the surface, which are termed by farmers rough-caps or hossacks, and are with difficulty got rid of, especially when numerous. From the extreme roughness and coarseness of the leaves, cattle seldom touch it, and possessing but little nutritive properties, does not merit the attention of agriculturists. It is said to grow in every kind of soil and situation, from the marsh to the dry sandy heath, but prefers moist clayey soils, where the water stagnates. It forms a good under cover for game and shelter for wild fowl. This grass is abundant in England, Scotland, and Ireland. It is found also in Lapland, Norway, Sweden, Germany, France, and Italy, as well as in the most northern parts of North America and the United States. Its limit of altitude is about 1500 feet above the sea.

Flowers in the third week of July, and ripens its seed about the middle of September.

36. Aira alpina.*

Smooth Alpine Hair-Grass.

Specific Characters.—Awn arising from a little above the centre

* *Aira alpina*, Smith, Hooker, Lindley.

of the floret, and not extending beyond the jagged summit. (Plate XXIII.)

Description.—It grows from twelve to eighteen inches high. The root is perennial, fibrous. *Stem* erect, round, smooth, and polished; bearing three or four leaves with smooth striated sheaths; the upper sheath longer than its leaf, crowned with a membranous acute ligule. *Joints* smooth. *Leaves* narrow, acute, mostly involute, roughish on the inner surface and margins, smooth on the back, and strongly ribbed. *Inflorescence* compound panicled. *Panicle* erect, slightly drooping at the summit, of a silky brown appearance; branches capillary, smooth, arranged on the smooth rachis in pairs, at certain distances. *Spikelets* numerous, with very delicate footstalks; of two, sometimes three-awned florets, the lower floret not protruding beyond the calyx. *Calyx* of two nearly equal acute membranous smooth glumes, (Fig. 1); the upper glume three-ribed; the lower without lateral ribs, and smooth on the keel. *Florets* of two paleæ, (Fig. 2); the outer palea of lowermost floret shorter than the glumes, of an oval form, jagged at the summit, hairy at the base, without lateral ribs; keel roughish, furnished with a short rough *awn* arising from a little above the *centre*, and extending as high as the *summit* of the palea. *Inner palea* rather shorter than the outer palea, membranous, and minutely fringed at the margins. Second floret elevated on a hairy pedicle, rather smaller than the lower floret, but similar to it in every other respect.

Obs.—This grass is readily distinguished from *Aira flexuosa*, which it somewhat resembles, in the awn arising from above the centre of the palea, and not extending beyond the summit of the palea;—whereas in *A. flexuosa* the *awn* arises from a little above the base, and extends considerably beyond the summit of the palea. (See Plate XXIV. Fig. 2.)

From *Aira cæspitosa*, in the awn arising from a little above the *centre* of the outer palea;—whereas in *A. cæspitosa* the awn arises from a little above the *base* of the outer palea. (See Fig. 2.)

Aira alpina is not unfrequently met with on several of the Highland mountains in Scotland, Ben Lomond, Ben Arthur, and moist rocks in Angus-shire, but is not found in England or Ireland, or below latitude 55. It is a northern plant, frequent in Lapland, and the

most northern parts of North America. Its lowest limit of altitude is 3000 feet above the sea.

Flowers in the first week of August, and ripens its seed in the second week of September. Sheep seldom touch it, as the leaves are generally found entire.

37. Aira flexuosa.*

Wavy Mountain Hair-Grass.

Specific Characters.—Awn arising from a little above the base of the floret, and extending considerably beyond its summit. (Plate XXIV.)

Description.—It grows from twelve to eighteen inches high. The root is perennial, fibrous, woolly in sandy ground. *Stem* erect, flattish, smooth, striated, bearing three or four leaves with roughish (from above downwards) striated sheaths; the upper sheath much longer than its leaf, crowned with a membranous acute ligule. *Joints* smooth. *Leaves* very narrow, acute, of a dark-green, the radical leaves smooth, long, and numerous; those of the stem roughish from point to base. *Inflorescence* compound panicled, of a pale brownish-green. *Panicle* erect, the branches spreading, very slender, roughish, triple-forked; lower part of the rachis and branches frequently wavy. *Spikelets* erect, of two-awned florets, not protruding beyond the calyx. *Calyx* of two nearly equal membranous glumes (Fig. 1), without lateral ribs, and slightly roughish at the keels. *Florets* of two paleæ, (Fig. 2), the outer palea of lowermost floret bifid at the summit, hairy at the base, with two delicate ribs on each side; keel roughish, furnished with a slender awn arising from a little above the base, and extending considerably beyond the summit of the palea. *Inner palea* membranous, very thin, about equal in length to the outer palea, and very minutely fringed at the margins. Second floret elevated on a hairy footstalk, rather smaller than the lower floret, but similar to it in every other respect.

Obs.—*Aira flexuosa* is distinguished from *Aira caryophyllea*, in the spikelets being twice as large, and the upper sheaths rough from

* *Aira flexuosa*, Linn. Smith, Koch, Hooker, Greville.

above downwards;—whereas in *A. caryophyllea* the spikelets are very small, and the sheaths rough from below upwards.

This grass grows on heaths and hilly places, and is sometimes found at an elevation of 3500 feet above the sea. It does not thrive on a clayey soil. Sheep eat it, but is not recommended for cultivation. It abounds in England, Scotland, and Ireland; also found in Lapland, Norway, Sweden, Germany, France, and Italy, as well as in the middle and most northern parts of North America.

Flowers in the first week of July, and ripens its seeds in the middle of August.

38. Aira caryophyllea.*

Silver Hair-Grass.

Specific Characters.—Awn longer than the palea, arising from a little beneath the middle. Panicle spreading. (Plate XXIV.)

Description.—It grows from six to twelve inches high. The root is annual, fibrous. *Stem* erect, round, smooth, and striated, bearing three or four leaves with striated roughish sheaths (the roughness is mostly on the upper half, arising from minute spicula with their *points directed downwards*); the upper leaf much longer than its sheath, crowned with a prominent acute ligule. *Joints* smooth. *Leaves* mostly all on the stem, short, narrow, roughish to the touch. *Inflorescence* compound panicled, of a silvery grey. *Panicle* erect, the branches spreading occasionally zig-zag, but not wavy, slightly roughish, triple-forked, often tinged with purple; rachis smooth. *Spikelets* small, rounded at the base, and somewhat tumid; of two awned florets not protruding beyond the summit of the glumes. *Calyx* of two equal membranous glumes, (Fig. 1), without lateral ribs, slightly toothed at the keels. *Florets* of two paleæ, (Fig. 2), the outer palea of lowermost floret bifid or somewhat beaked at the summit, hairy at the base, without lateral ribs, furnished with a slender awn, arising from a little beneath the centre, and extending about half its length beyond the summit of the palea. *Inner palea* membranous,

* *Aira caryophyllea*, Linn. Smith, Hooker, Greville, Lindley.

thin, about equal in length to the outer palea, and very minutely fringed at the margins. Second floret on a very short *smooth* pedicle, but in other respects similar to the one below.

Obs.—This grass is very closely allied to *Aira præcox*, especially when young, but differs from it in being generally a taller plant, with smaller spikelets; the branches of the panicle more spreading, especially when in seed; the calyx somewhat of a quadrangular form, rounded at the base; the awn arising from a little beneath the centre of the palea;—whereas in *A. præcox* the panicle is close, the calyx of a triangular form, nearly acute at the base, and the awn arises from nearer the base. (See Plate XXV. Figs. 1, 2, 3.)

This grass to the farmer is of minor consideration, as it produces but little foliage, which soon withers. It grows on dry gravelly places, and is frequent in England, Scotland, and Ireland, as well as in Germany, France, and Italy, but has not been discovered in Lapland or America. Its limit of altitude about 1500 feet above the sea.

Flowers in the third week of June, and ripens its seed in the end of July.

39. Aira præcox. *

Early Hair-Grass.

Specific Characters.—Awn longer than the palea, arising from a little above the base. Panicle close. (Plate XXV.)

Description.—It grows from four to six inches high. The root is annual, fibrous. *Stem* erect, round and smooth, bearing four or five leaves, with rough, striated, slightly inflated sheaths, (the roughness is mostly on the upper part of the sheaths, very perceptibly felt when the finger is passed from below upwards, but smooth in the opposite direction); the upper sheath longer than its leaf, crowned with a lanceolate membranous ligule, closely embracing the stem; the lower sheaths shorter than their leaves. *Joints* smooth. *Leaves* mostly all on the stem, narrow, roughish to the touch, especially the uppermost ones. *Inflorescence* simple panicled; of a greenish silvery appearance. *Panicle* erect, close; the branches roughish; rachis

* *Aira præcox*, Smith, Hooker, Lindley, Greville.

mostly smooth. *Spikelets* of two awned florets, both enclosed within the calyx. *Calyx* of two equal acute glumes, (Fig. 1), without lateral ribs, minutely toothed on the keels. *Florets* of two paleæ, (Fig. 2); the outer palea of lowermost floret bifid or somewhat beaked at the summit, hairy at the base, roughish on the back; obscurely five-ribbed; furnished with a long, slender, rough awn, arising from a little above the base, and extending about half its length beyond the summit of the palea. *Inner palea* membranous, about equal in length to the outer palea, and very minutely fringed at the margins. Second floret elevated on a short smooth pedicle, but in other respects similar to the floret below.

Obs.—*Aira præcox* is sometimes with difficulty distinguished from *Aira caryophyllea*, but may be at all times known by the panicle being close, not exceeding half-an-inch in width; *calyx* rather acute at the base;—whereas *A. caryophyllea* is generally a taller plant, with much smaller spikelets. *Panicle* spreading, seldom less than an inch in width. Calyx somewhat rounded at the base.

An early grass of little value; the leaves soon dry up. Found on sandy hills and wall tops. Occasionally met with in Scotland, but not common; more frequent in England and Ireland. Found in Germany, France, Italy, and North America, but not known in Lapland. Its limit of altitude is about 1500 feet above the sea.

Flowers in the last week of May, and ripens its seed by the end of June.

40. Arrhenatherum avenaceum.*

Oat-like Soft-Grass.

There is but one species of this genus known. (Plate XXV.)

Description.—It grows from two to three feet high. The root is perennial, fibrous, sometimes bulbous. *Stem* erect, round and polished, bearing four or five leaves with striated mostly smooth sheaths; the upper sheath much longer than its leaf, smooth, sometimes roughish, crowned with a small obtuse ragged ligule. *Joints*

* *Arrhenatherum avenaceum*, Lindley, Hooker. *Arrhenatherum elatior*, Koch. *Holcus avenaceus*, Smith, Hooker, *Fl. Scot.* Greville.

smooth, occasionally hairy. *Leaves* flat, narrow, acute, harsh, roughish on both surfaces, but more so on the inner surface. *Inflorescence* simple panicled. *Panicle* leaning slightly to one side; the branches rather short and rough, the lower ones arising from the rachis mostly in fives. *Spikelets* rather large, erect, mostly on long footstalks, of two awned florets. *Calyx* of two very unequal acute membranous glumes, (Fig. 1); the upper one the larger, three-ribbed, roughish along the central rib; the lower glume without lateral ribs, and about one-half the size of the upper glume. *Florets* of *two paleæ*, (Fig. 2), the outer palea of lowermost floret about the length of the calyx, acute roughish, *seven-ribbed*, the central rib roughish, hairy at the base, furnished with a long slender awn, longer than the palea, and arising from a little *above the base*. *Inner palea* membranous, linear, acute, minutely fringed at the margins. Second floret elevated on a short hairy pedicle, furnished with a *very short awn*, arising from a little beneath the *apex* of the outer palea; the floret in every other respect is the same as the lower one.

—— —— *bulbosum*, (Plate XXVI.) a common variety with bulbous or knotty roots, found in rich cultivated fields, also on light dry soils.

Obs.—*Arrhenatherum avenaceum* is readily distinguished from other grasses, by having two florets, the lower floret with a long awn arising from a little above the base of the outer palea, the *second floret* with a very short awn arising immediately from a little beneath the apex. (See Fig. 2).

This grass produces a plentiful and early supply of foliage, and is valuable either for hay or pasture, but its agricultural merits in this country are as yet but little known. On the continent it is highly prized, and eaten with avidity by all kinds of cattle, although it is said to be unpalatable to horses. It is found growing in woods and pastures, and is frequently a troublesome weed in corn-fields. Its produce is said to be greater on a clayey than on a heathy soil, in the proportion of 25 to 8.

It is frequent in Scotland, England, Ireland, Germany, France, Italy, and the United States, but does not exist in Lapland or the

northern parts of North America. Its limit of altitude seems to be about 1500 feet above the sea.

Flowers in the third week of June, and ripens its seeds about the end of July.

The observations of Mr Lawson in his valuable work on agriculture tends in a great measure to prove that the bulbous variety deserves a claim as a distinct species. He states, " that the seeds of the true fibrous variety never produce bulbous-rooted plants, although sown in the most light dry soils, and suffered to grow on such for a great length of time. Seeds of the bulbous-rooted sort will, on the other hand, produce plants having bulbous roots the first season of their growth, on whatever kind of soil they may be sown." Such also seems to be the opinion of Professor Lindley, Professor Schrader, Sir Thomas Cullum, and others; which Sir James Smith, Sir William Hooker, and Professor Koch do not seem inclined to admit, as the roots of *Phleum pratense* and *Alopecurus geniculatus*, which are mostly fibrous, become bulbous on a dry barren soil.

41. Avena strigosa. *

Bristle-pointed Oat.

Specific Characters.—Florets equal in length to the calyx, and terminating in two long straight bristles. (Plate XXVI.)

Description.—It grows to the height of three feet. The root is annual, fibrous. *Stem* erect, round, smooth, and polished, bearing four or five leaves, with smooth, striated sheaths; the upper sheath longer than its leaf, crowned with an oblong membranous, often ragged ligule. *Joints* smooth. *Leaves* rather broad, acute, rough to the touch on both surfaces, more or less glaucous; the central rib on the under surface polished. *Inflorescence* simple panicled, very much resembling the common cultivated oat in appearance. *Panicle* mostly turned to one side, with long, rough, lateral branches; the rachis mostly smooth. *Spikelets* large, oval, of two awned florets. *Calyx* of two rather unequal acute membranous smooth somewhat polished glumes (Fig 1); the lower glume the smaller, seven-ribbed;

* *Avena strigosa*, Linn., Smith, Koch, Hooker, Lindley.

the upper glume nine-ribbed; the ribs conspicuous, of a greenish colour. *Florets* of two paleæ (Fig. 2), the outer palea of lowermost floret equal in length to the large glume, terminating in two straight rough bristles; six-ribbed, roughish to the touch, (sometimes hairy.) *Inner palea* membranous, shorter than the outer palea, linear, acute, the margins delicately fringed. The second floret elevated on a hairy footstalk. *Awn* stout, rough, bent, arising a little below the centre of the outer palea, and about twice the length of the palea.

Obs.—*Avena strigosa* very much resembles the common cultivated oat (*Avena sativa*) in its general appearance, but is readily distinguished from it as well as from *Avena fatua*, in the florets terminating in two long straight bristles.

In Scotland this grass is not unfrequent, especially in Inverness, Aberdeen, Forfar, and Perthshires, generally in corn-fields and waste places. In England it occurs in the counties of Durham, York, Denbigh, Notts, Anglesea, Sussex, and Cornwall. Confined principally to the central parts of Europe; not found in Italy, Lapland, or America. Its limit of altitude is about 1000 feet above the sea.

Flowers in the first week of July, and ripens its seed in the middle of August.

42. Avena fatua.*

Wild-Oat.

Specific Characters.—Floret shorter than the calyx; not bristled at the summit. (Plate XXVII.)

Description.—It grows to the height of three feet. The root is annual, fibrous, thick at the base. *Stem* erect, round, smooth, and polished; bearing four or five leaves with smooth striated sheaths, (sometimes the lower sheaths are hairy); upper sheath longer than its leaf, crowned with an obtuse membranous ligule. *Joints* smooth. *Leaves* flat, linear, finely ribbed, rough to the touch, occasionally hairy. *Inflorescence* simple panicled. *Panicle* large, spreading; the rachis smooth, the branches rough. *Spikelets* large, ovate-lanceolate, drooping or pendulous, of two, occasionally three florets.

* *Avena fatua*, Linn. Koch, Smith, Hooker Lindley.

Calyx of two membranous smooth acute glumes (Fig 1), nearly of equal lengths; the outer glume the smaller, seven-ribbed; the inner glume eleven-ribbed. *Florets* of two paleæ, (Fig. 2), the outer palea of lowermost floret ovate, acute, much shorter than the calyx, eight-ribbed, furnished with several long reddish-brown hairs, with their points directed upwards. *Inner palea* shorter than the outer palea, membranous, with two green marginal ribs minutely fringed. *Awn* more than twice the length of the floret, of a reddish-brown, twisted and bent, arising a little beneath the centre of the outer palea. Seeds hairy.

Obs.—Avena fatua is distinguished from *Avena strigosa* in the florets being much shorter than the calyx; *outer palea* with four ribs on each side; the summit acute, but not awned;—whereas in *A. strigosa* the florets are equal in length to the calyx; *outer palea* with only three ribs on each side; the summit terminating in two acute stout bristles.

From *Avena sativa*, (common cultivated oat), in the *spikelets* being much larger; *outer palea* very hairy, with *four* ribs on each side; —whereas in *A. sativa* the *outer palea* is not hairy, and there are but *three* ribs on each side.

This grass is generally found in corn-fields, especially among barley, where it proves a troublesome weed. It is occasionally met with in Scotland, but more frequent in England and Ireland. It occurs in Lapland, Norway, Sweden, Germany, France, Italy, Asia, and North Africa. Not found in America.

Flowers in the first week in July, and ripens its seed about the end of August. Its limit of altitude seems to be about 1000 feet above the sea.

The florets, on account of their somewhat resemblance to artificial flies, are occasionally used by rustic fishermen to catch trout, and often with success.

The awns make excellent hygrometers, being very sensitive to the humidity of the atmosphere, which causes them to expand, and during dry weather they contract.

43. Sesleria cærulea. *

Blue Moor-Grass.

Specific Characters.—Raceme oval. Outer palea toothed at the summit. (Plate XXVII.)

Description.—It grows from six to twelve inches high. The root is perennial, creeping, throwing out long fibres. *Stem* slender, of a light green, erect, round, and smooth, bearing three very short leaves with smooth sheaths; the upper sheath more than eight times the length of its leaf, crowned with a short obtuse membranous ligule; the lower sheaths also longer than their leaves. *Joints* covered by the sheaths, situated near the base. *Leaves* from the root rather long, linear, and narrow, compressed when young, terminating in a sharp point; eleven-ribbed, the central rib the most prominent, especially on the posterior surface; the margins minutely toothed; slightly roughish on the inner surface, smooth and polished behind; those on the stem broad for their length, especially the two lowermost, which are rather near together, the upper one situated about the centre of the stem, the edges minutely serrated as well as the dorsal rib, which terminates in a minute point. *Inflorescence* racemed. *Raceme* of an oval form, seldom exceeding half-an inch in length; of a bluish purple appearance. *Spikelets* imbricated on all sides of the rachis, arranged mostly in pairs on very short footstalks; of two or three awned florets, protruding beyond the calyx, (Fig. 3.) *Calyx* of two nearly equal acute broad membranous glumes, (Fig. 1), without lateral ribs, and minutely toothed on the upper half of the keels. *Florets* of two paleæ, (Fig. 2), the outer palea of lowermost floret five-ribbed, four-toothed at the summit, the central rib rough and terminating in a short awn. *Inner palea* linear, bifid at the summit, about equal in length to the outer palea, furnished with two green marginal ribs minutely fringed. *Filaments* three, capillary, protruding beyond the paleæ. *Anthers* prominent, not quite the length of the inner palea, linear, notched at each end, of a bleached appearance. Ovarium, small, white, globose, pointed at the base, very

* *Sesleria cærulea*, Koch, Smith, Hooker, Lindley.

hairy. *Style* short, combined. *Stigmas* long, linear, downy, at first united nearly to the summit, afterwards separate, protruding very conspicuously beyond the paleæ. Scales two, membranous, acute. (Fig. 4.)

Obs.—This grass is so striking in its general appearance that there is no other it can well be mistaken for. It is readily distinguished from *Alopecurus alpinus* and *Phleum alpinum*, in the calyx containing more than one floret. (See Plates IV. VI.)

On some of the Highland mountains in Scotland, this grass is found plentiful, especially on Ben Lomond, at an elevation of 3000 feet above the sea. In England it is found in the counties of York, Westmorland, Cumberland, and Durham. Occasionally in Ireland, in the county of Sligo, on limestone rocks. It is also found in Iceland, Sweden, Germany, France, and Italy.

Flowers in the end of April and beginning of May, and ripens its seed about the middle of June.

44. Cynosurus cristatus. *

Crested Dog's-tail Grass.

Specific Characters.—Florets with a very short awn. (Plate XXVIII.)

Description.—It grows from twelve to eighteen inches high. The root is perennial, fibrous, tufted. *Stem* erect, round, smooth, and finely striated, bearing five leaves with smooth sheaths; the upper sheath longer than its leaf, crowned with a short obtuse ligule. *Joints* smooth. *Leaves* flat, narrow, acute, rough on the inner surface, smooth and glossy behind. *Inflorescence* simple panicled. *Panicle* erect, from an inch to an inch and a-half or more in length, linear, at first green, turning brown with age; lateral branches very short, rough, arranged alternately on the rough, wavy, ribbed rachis. *Spikelets* of three to five florets, accompanied at the base with a beautiful pectinated involucre with rough linear acute somewhat curved divisions, (Figs. 3, 4); the spikelets and involucres are directed to one side of the rachis, which is by that means completely hidden,

* *Cynosurus cristatus*, Lindley, Linn., Hooker, Smith, Greville.

while the other side is visible. *Calyx* of two narrow acute membranous glumes (Fig. 1), of equal lengths, without lateral ribs; the keel rough. *Florets* of two paleæ (Fig. 2), the outer palea of lowermost floret longer than the calyx, of an ovate lanceolate form, obscurely five-ribbed, tipped with a short rough awn. *Inner palea* membranous, pellucid, rather shorter than the outer palea, with the margins minutely fringed.

This is a most valuable grass for permanent pasture, but by no means recommended for the purpose of hay, as the stems when dry are hard and tough, containing but little nutritive matter at the time the seed is ripe; but during the time of flowering the grass is succulent and tender, affording twice the quantity of nourishment than at a more advanced stage, when it becomes the favourite food of deer and sheep. It thrives better in tenacious elevated soils, than in those of a drier or sandy nature, and in irrigated meadows attains an unusual size. As cattle prefer the young leaves, the stems remain untouched, and when dry assume an unsightly appearance in pastures, lawns, and pleasure-grounds, where this grass generally abounds. The stems are valuable for the manufacture of plat for Leghorn hats and bonnets, and are said to be superior even to the Italian straw. For this purpose they should be gathered in a green state, about the time of flowering, and covered with boiling water for ten minutes, afterwards spread out to bleach for eight days; or they may be placed in boiling water for one hour, afterwards spread out and kept regularly moistened as they become dry for two days, then place them in a close vessel, and subject them to the fumes of burning sulphur for two hours. Also, by immersing the stems for ten minutes in a strong solution of acetic acid, then subjecting them to sulphurous acid gas, they become bleached in half-an hour.

There are many species of grasses found in this country adapted to supply fine and beautiful straw not inferior to that of Leghorn, viz. *Festuca ovina angustifolia, Festuca duriuscula, Nardus stricta, Poa pratensis umbrosa, Hordeum pratense, Trisetum flavescens, Agrostis alba,* and *Agrostis canina.*

Cynosurus cristatus is a common grass in Scotland, England, and Ireland, in open pastures. Found also in Norway, Sweden, Prussia,

Germany, France, Spain, Portugal, Switzerland, and Italy, but has not been discovered in Lapland or America. Its limit of altitude, 2000 feet above the sea.

Flowers in the first week in July, and ripens its seed in the second week of August.

45. Cynosurus echinatus. *

Rough Dog's-Tail Grass.

Specific Characters.—Florets with a long awn, about equal in length to the palea. (Plate XXVIII.)

Description.—It grows from ten to twenty inches high. The root is annual, tufted, strong, frequently with woolly fibres. *Stem* erect, round, smooth, and finely striated, bearing five leaves with slightly roughish sheaths; the upper sheath about equal in length to its leaf, crowned with a long pointed ligule. *Joints* short, smooth. *Leaves* flat, broad at the base, tapering to a sharp point, rough on both surfaces, of a dull light green. *Inflorescence* simple panicled, dense, various in luxuriance, of a silvery green. *Panicle* somewhat oval, from half-an inch to an inch in length, and from a quarter to half-an inch broad, with very short rough branches all leaning to one side. *Spikelets* usually of three-awned florets, accompanied at the base with a beautiful pectinated involucre, with rough acute divisions, Fig. 3, (Fig. 4, involucre magnified.) *Calyx* of two narrow acute membranous glumes, nearly of equal lengths, without lateral ribs, roughish on the keels (Fig. 1.) *Florets* of two paleæ; the outer palea of lowermost floret much shorter than the calyx, of an ovate lanceolate form, five-ribbed, tipped with a long slender rough awn, about equal in length to the palea, (Fig. 2.) *Inner palea* membranous, pellucid, rather shorter than the outer palea, with the margins minutely fringed.

Obs.—This plant, independent of its dense bristly panicle, is distinguished from *Cynosurus cristatus* in many respects; as in the leaves being broader and roughish behind; *ligule* long and acute; *calyx* much longer than the lowermost floret; *awn* equal in length or longer than the outer palea, and the *involucre* larger, rougher, and more bristly;—whereas in *C. cristatus* the leaves are smooth and po-

* *Cynosurus echinatus*, Linn. Koch, Smith, Hooker, Lindley.

lished behind; *ligule* short and obtuse; *calyx* shorter than the lowermost floret; *awn* very short, about one-fourth the length of the palea; and the *involucre* acute but not awned.

Professor Graham, at a meeting of the Royal Botanical Society, November 12, 1840, mentioned the *Cynosurus echinatus* as having been found by Mr Thomas Edmonston, on a barren moor in one of the Shetland Islands, being the only locality known in Scotland for this interesting addition to the Scottish Flora. It is also met with, although not common, in Northumberland, Durham, and the Isle of Jersey. It does not occur in Ireland, Lapland, Norway, Sweden, or America, or further north than the Shetland Islands. It is found in Germany, France, Spain, Portugal, Italy, and Northern Africa. Of no material agricultural use.

Flowers in the end of June, and ripens its seed in August.

46. Dactylis glomerata.*

Rough Cock's-Foot Grass.

Specific Characters.—Spikelets in dense globular unilateral tufts. Outer palea with a minute point a little beneath the summit. (Plate XXIX.)

Description.—It grows to the height of two feet or more. The root is perennial, fibrous, tufted. *Stem* erect, round, striated, and rough, bearing five or six leaves with rough striated sheaths; the upper sheath crowned with an elongated, membranous, often torn ligule. *Joints* smooth. *Leaves* linear, flat, acute, spreading, rough on both surfaces, harsh, of a dull-green, the edges minutely toothed. *Inflorescence* compound panicled. *Panicle* erect, tufted, the upper part dense; rachis and branches rough; the lowermost branches spreading and furnished with a tubercle at the base. *Spikelets* numerous, crowded, unilateral, on short, rough footstalks; usually of three florets. *Calyx* of two unequal glumes, (Fig. 1), membranous, more or less hairy, especially on the keels. *Florets* of two paleæ (Fig. 2); the outer palea of lowermost floret rather longer than the calyx, five-ribbed, hairy on the keel, furnished with a minute point arising

* *Dactylis glomerata*, Linn. Smith, Hooker, Lindley, Greville.

from a little beneath the summit. *Inner palea* membranous, about equal in length to the outer palea, and minutely fringed at the margins.

The Cock's-Foot Grass, one of the commonest of all grasses, is found in orchards, woods, hedges, and waste places, and is said to have been originally introduced from Virginia by the Society of Arts. It grows most luxuriantly in damp and shady situations. As an agricultural grass, Mr Sinclair states, that it is deserving of particular notice, that the herbage, when suffered to grow rank or old for want of sufficient stocking, contains nearly one-half less nourishment than that which is of recent growth. Hence this grass is of more value for pasture than for hay; yet, even for the latter purpose, it will be found superior to rye-grass (*Lolium perenne*), and many other grasses. To reap the full benefit of its merits as a pasture grass, it should be kept closely cropped either by cattle or the scythe. Oxen, sheep, and horses eat this grass readily, but dislike it when allowed to grow too coarse. It succeeds best when the subsoil is porous and not stagnant, so that the fibrous root may penetrate to a considerable depth, which causes the plant to be productive in an extraordinary degree, and remains permanent. But when the surface soil is thin, incumbent on tenacious clay, or when the subsoil is retentive of superfluous moisture, this grass succeeds imperfectly, and the slender hold that the roots have in such soil renders the plant liable to be drawn out of the ground by the cattle when grazing. The pastures most celebrated for fattening stock in Devonshire, Lincolnshire, and in the vale of Aylesbury, are partly formed of this grass. It is less impoverishing to the soil than the *rye-grass.* A combination of three parts, *cock's-foot,* and one part composed of *Festuca duriuscula, Bucetum pratense, Poa trivialis, Phleum pratense,* and *Lolium perenne* will secure the most productive and nutritive pasture in alternation with grain crops.

Dactylis glomerata is common throughout Scotland, England, Ireland, Norway, Sweden, Denmark, Germany, France, Spain, Portugal, Northern Africa, Russia, and the United States. It is not found in Lapland, or further north than latitude 63. Its limit of altitude seems to be about 1000 feet above the sea.

Flowers from June till August.

47. Arundo Phragmites.*

Common Reed.

Specific Characters.—Florets longer than the calyx. (Plate XXIX.)

Descriptions.—It grows from five to six feet high. The root is perennial, creeping. *Stem* erect, round, stout, and smooth; bearing fifteen or more leaves, all nearly of equal size, with somewhat roughish striated sheaths, longer than their leaves and without ligules. *Joints* about fifteen, smooth and polished. *Leaves* broad, lanceolate, many-ribbed, smooth on both surfaces as well as on the edges, about a foot in length, arranged on one side of the stem, frequently split at their summits, and divided in almost capillary points. *Inflorescence* compound panicled. *Panicle* very large, at first chocolate colour, at length of a light brown, drooping to one side; branches half-whorled, angular, nearly smooth, the base of lowermost branches often furnished with a tuft of short silky hair. *Spikelets* numerous, before flowering, ovate-lanceolate, afterwards spreading, of three awnless florets. *Calyx* of two unequal narrow acute glumes (Fig. 1,) with a rib on each side; the uppermost glume elevated on a short peduncle. *Florets* of two paleæ (Fig 2), the outer palea of lowermost floret about twice the length of the large glume, lanceolate, three-ribbed. *Inner palea* short, about half the length of the outer palea, minutely fringed on the upper part. Pedicle of the second floret with long, white, silky hairs, gradually elongated as the flowers advance, and finally spreading in every direction, giving a beautiful silky like appearance to the large panicle while waving in the wind.

Although this grass or reed has no agricultural merits, yet it is serviceable in many points of view. "In Sweden the country people use the panicle to dye woollen cloth green. The reeds are used for thatching, and found to be more durable than straw. Garden screens are made of them, and they form a good foundation for plaster floors; they are also in demand by brick-makers. Till the introduction (in the seventh century) of pens made from the quills

* *Arundo phragmites*, Linn. Smith, Hooker, Greville, Lindley. *Phragmites communis*, Koch.

of birds they were likewise in general use for writing. They also occasionally serve for arrows. The young shoots cut off from the root, where not exposed to the light, make an excellent pickle. The nest of the sedge-warbler is generally found suspended between the stems at a small height from the ground. Entomologists may sometimes find a considerable variety of insects on the panicles, whither they resort for food or shelter," * and it also forms an excellent shelter for wild-fowl.

This is a common plant in Scotland, England, and Ireland, found in ditches, margins of lakes, and rivers. It is also a native of Lapland, Norway, Sweden, Denmark, Germany, France, Spain, Portugal, Italy, Russia, North Africa, New Holland, British America, and the United States.

Flowers in August, and ripens its seed in September.

48. Triodia decumbens. †

Heath-Grass.

Specific Characters.—Florets four. Glumes smooth. (Plate XXX.)

Description.—It grows from five to twelve inches in length. The root is perennial, somewhat creeping, with strong fibres. *Stem* smooth, round, striated, bearing three or four leaves with somewhat hairy sheaths, the upper sheath shorter than its leaf, crowned with a *tuft of hairs in place of a ligule.* *Joints* smooth. *Leaves* linear, narrow, smooth on the lower part, very rough towards the points. *Inflorescence* racemed or simple panicled. *Panicle* of few spikelets. *Spikelets* rather large, of four awnless florets, *not extending beyond the calyx*, erect, on smooth footstalks arising alternately on the rachis. *Calyx* of two nearly equal acute smooth glumes (Fig. 1), three-ribbed. *Florets* of two paleæ (Fig. 2), the outer palea of lowermost floret of an ovate form, five-ribbed, *three-toothed at the summit*, hairy at the base. *Inner palea* broad, obtuse, furnished with two green marginal ribs minutely fringed.

Obs.—*Triodia decumbens* is distinguished from the genus *Poa* in

* Withering's *British Plants.*

† *Triodia decumbens*, Hooker, Lindley, Koch. *Festuca decumbens*, Linn. *Poa decumbens*, Withering, Smith, Greville, Hooker, *Fl. Scot.*

the *spikelets* being much larger. *Floret* not protruding beyond the calyx. *Outer palea* three-toothed at the summit, and the *sheaths* crowned with a tuft of hairs in place of a ligule;—whereas in *Poa*, the *florets* almost always extend beyond the calyx. *Outer palea* entire at the summit, and the sheaths crowned with a membranous ligule without hairs.

This grass is not of sufficient importance to be recommended for cultivation. It is found growing on dry mountain pastures, and also on wet barren ground, sometimes at an elevation of 1000 feet above the sea. It is a common grass throughout Scotland, England, and Ireland; also a native of Norway, Sweden, Prussia, Germany, France, Spain, Portugal, Switzerland, Italy, Turkey, and Greece. Not found in Lapland or America.

Flowers in the last week in July, and ripens its seed early in August.

49. Briza media.*

Common Quaking-Grass.

Specific Characters.—Spikelets broadly ovate. Ligule very short and blunt. (Plate XXX.)

Description.—It grows from twelve to eighteen inches high. The root is perennial, fibrous, tufted. *Stem* erect, smooth, round, and slender, bearing four leaves with smooth striated sheaths; the upper sheath much longer than its leaf, crowned with a short obtuse ligule. *Joints* smooth. *Leaves* flat, acute, roughish on the inner surface. *Inflorescence* simple or compound panicled. *Panicle* erect, broad, of a triangular form; branches spreading, smooth, very slender, slightly wavy, round, arranged in alternate pairs on the smooth rachis. *Spikelets* broadly ovate, compressed, variegated with purple, brown and white, pendulous, on long slender footstalks; of about seven awnless florets, protruding beyond the calyx. *Calyx* of two nearly equal broad obtuse glumes (Fig. 1), membranous at the margins, furnished with three ribs. *Florets* of two paleæ (Fig. 2), the outer palea of lowermost floret broad, obtuse, compressed, membranous at the mar-

* *Briza media*, Linn., Smith, Hooker, Lindley, Greville, Koch.

gins, without lateral ribs, lobed at the base. *Inner palea* membranous, about equal in length to the outer palea, furnished with two green marginal ribs, delicately fringed on the upper part.

This grass is best suited for poor soils, as manure or rich ground is even hurtful to it. Horses, cows, and sheep eat it, but is of little value as a pasture grass, as it grows only on such soils as are not beneficial to the growth of the more superior grasses.

This is a frequent grass throughout Scotland, England, and Ireland, especially in fields and pastures of poor soil. It is also a native of Norway, Sweden, Prussia, Germany, France, Spain, Portugal, Switzerland, Italy, Turkey, Greece, Russia, and the United States. It has not been found in Lapland, or further north than latitude 62. Its limit of altitude is about 1500 feet above the sea.

Flowers in the last week of June, and ripens its seed in July.

50. Hierochloe borealis.*

Holy-Grass.

Specific Characters.—Branches of the panicle smooth. Leaves flat. (Plate XXXI.)

Description.—It grows from twelve to eighteen inches high. The root is perennial, creeping. *Stem* erect, round, smooth, and rather stout, bearing three or four leaves with smooth striated sheaths; the upper sheath much longer than its leaf, slightly tumid, crowned with a prominent, broad, obtuse, ligule. *Joints* smooth, situated near the base, covered by the sheaths. *Leaves* short, broad, lanceolate, rough on the inner surface, smooth behind. *Inflorescence* compound panicled. *Panicle* erect, upper part somewhat drooping; branches spreading, smooth, purplish, arising from the rachis in pairs. *Spikelets* rather large, of a glossy brownish green, tinged with purple, of three awnless florets, the upper one perfect, the two lower ones barren, all concealed within the calyx. *Calyx* of two nearly equal broad, acute, smooth glumes (Fig. 1,) without lateral ribs. *Florets* of two palea (Fig. 2), the outer palea of lowermost floret five-ribbed, somewhat hairy, roughish at the keel, fringed at the margins.

* *Hierochloe borealis*, Smith› Hooker, Lindley. *Hierochloe odorata*, Koch.

Inner palea rather shorter than the outer palea, entire at the summit, minutely fringed at the margins. Pedicle of the second floret slightly hairy. *Filaments* three in the barren florets, two in the perfect floret, capillary, rather longer than the floret. *Anthers* prominent, pendulous, notched at each end, of a bleached appearance. *Ovarium* ovate, acute. *Styles* two, distinct. *Stigmas* feathery, protruding beyond the palea. *Scales* narrow, acute.

Although this is one of the earliest of our flowering grasses, it cannot be recommended with advantage to the notice of agriculturists, as its powerful creeping root, and its great deficiency of spring foliage, are disadvantages which are not compensated by any merits the grass possesses.

This is a very rare British grass, found several years ago by the late G. Don, in the valley called *Kella*, Forfarshire, but has not since been discovered by any other botanist. It is a native of Lapland, Norway, Sweden, Germany, France, Italy, Kamtchatka, and Russian America.

Flowers early in May, and ripens its seed in June.

In Prussia, this grass is strewed before the doors of churches on festival days, and in Sweden it is sold to be suspended over beds, as it is supposed to induce sleep.

51. Poa pratensis.*

Smooth-Stalked Meadow-Grass.

Specific Characters.—Florets webbed.† Outer palea five-ribbed. The marginal ribs hairy. Uppermost sheath much longer than its leaf. (Plate XXXI.)

Description.—Its usual height from a foot to fifteen inches. The root is perennial, in loose sandy soil extensively creeping. *Stem* erect, smooth, round, bearing three or four leaves with smooth, striated sheaths; the upper sheath much longer than its leaf, crowned

* *Poa pratensis*, Linn. Koch, Hooker, Smith, Greville.

† That is, the lowermost florets connected at their base by a web of long silky filaments, suspending the calyx; which may be distinctly seen by gently detaching the calyx from the florets. (See Plates XXXI. to XXXVII. Figs. 1 and 2.)

with an obtuse membranous ligule (Fig. 5.) *Joints* smooth. *Leaves* linear, flat, acute, roughish on the edges and inner surface, smooth behind towards the base. *Inflorescence* panicled, spreading, erect, occasionally somewhat drooping; the branches roughish, the lower ones generally in threes or fives. *Spikelets* ovate, slightly compressed, from three to five florets, the summit of the lower floret extending but slightly beyond the large glume of the calyx. *Calyx* of two nearly equal acute glumes (Fig. 1), three-ribbed, the dorsal rib toothed on the upper part; the lateral ribs of lowermost glume often wanting. *Florets* of two awnless paleæ (Fig. 2); the outer palea of lowermost floret five-ribbed; the lower half of the dorsal and marginal ribs hairy, the intermediate ribs naked (Fig. 4); the base of the floret furnished with a copious web, suspending the calyx. *Inner palea* a very little shorter than the outer palea, occasionally bifid at the summit, furnished with two green marginal ribs, delicately fringed. The whole plant is of a light pleasant green; the spikelets frequently variegated with brownish purple.

—— —— *planiculmis.* This variety has a stout, compressed stem, with short broad leaves; the upper leaf folded, compressed, with the summit rounded behind. Panicle erect; spikelets large; the lowermost branches smooth, and mostly in pairs. The whole plant is of a dark-green. Common by road-sides. (Plate XXXII.)

—— —— *umbrosa,* a tall, slender variety, with a somewhat drooping panicle; the branches rough, the lower ones generally in fives. Leaves long and narrow. The whole plant of a light pleasant green. Frequent in shady places. Often mistaken for *Poa nemoralis.* (Plate XXXII.)

—— —— *arida,* a variety about a foot high, with the panicle somewhat drooping. Stem sheathed nearly to the summit, with the upper leaf passing behind the panicle. The whole plant soon assumes a bleached appearance. Common in dry exposed situations. (Plate XXXIII.)

—— —— *retroflexa,* a small slender variety, with the lower branches of the panicle suddenly bent downwards. Frequent in pastures under shady trees. Occasionally mistaken for *Poa distans.* (Plate XXXIII.)

—— —— *muralis*, a slender variety, from five to eight inches high, with a short, upright panicle. Frequent on tops of walls in shady places. (Plate XXXIV.)

—— —— *arenaria*, a stout upright variety, with large, somewhat angular spikelets. Outer palea seven-ribbed. Inner palea frequently divided to the base. The whole plant somewhat of a glaucous appearance. Frequent in sandy situations along the sea coast. (Plate XXXIV.)

Many other varieties might be enumerated assuming various forms, but those already noticed will be sufficient to show, that, whatever the variety may be, whether of a most luxuriant habit, or of a small stunted growth, the specific characters always remain constant, namely, upper leaf much shorter than its sheath; the *ligule* obtuse; *florets* webbed; *outer palea* five-ribbed, (except in variety *arenaria*), with the marginal ribs hairy, so that *Poa pratensis* can never be confounded with any other *Poa*. (See Figs. 1 and 2, which represent the calyx and floret magnified; Fig. 5, the obtuse ligule.)

Obs.—Poa pratensis is distinguished from *Poa trivialis* in the *ligule* being obtuse, and the *marginal ribs* of the outer palea hairy;—whereas in *P. trivialis* the *ligule* is long and pointed, and the *marginal ribs* of the outer palea are not in the slightest degree hairy.* (See Fig. 4.)

From *Poa nemoralis*, in the *upper sheath* being much longer than its leaf; *ligule* prominent;—whereas in *P. nemoralis* the upper sheath is about equal in length to its leaf, and sometimes even shorter; *ligule* very short, scarcely perceptible. (See Plate XXXVI. Fig. 5.)

From *Poa compressa*, in the *upper sheath* being much longer than its leaf; *outer palea* five-ribbed;—whereas in *P. compressa*, the *upper sheath* is about equal in length to its leaf; *outer palea* only three-ribbed. (See Plate XXXVII. Fig. 4.)

It is distinguished from all other British grasses in the lower florets being webbed.

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* The roughness or smoothness of the sheaths is supposed by some authors to form a good specific character, but it cannot at all times be depended on, as in some varieties of *P. pratensis* the sheaths are occasionally roughish, while in *P. trivialis* they are sometimes nearly smooth.

Poa pratensis is an early grass, producing a large quantity of herbage, which is liked by all cattle; but its creeping root is said to impoverish the soil, and is therefore not recommended for cultivation, the fibrous-rooted grasses being always preferred. When this grass is intended for hay, it should be cut during the time of flowering, for if allowed to remain till the seed is ripe a loss of more than one-fourth part of the whole crop is sustained. The stems are said to be used for the manufacturing of plat for straw-bonnets in imitation of Leghorn.

This is a common grass in meadows, pastures, and road-sides throughout England, Ireland, and Scotland. It is also a native of Lapland, Norway, Sweden, Denmark, Prussia, Germany, France, Spain, Portugal, Switzerland, Italy, North Asia, Iceland, and the United States. It is sometimes found at the altitude of 3000 feet above the sea.

Flowers in the first week of June, and ripens its seed in the first week of July.

52. Poa trivialis.*

Rough-stalked Meadow-Grass.

Specific Characters.—Florets webbed. Outer palea five-ribbed. The marginal ribs not hairy. Ligule long and pointed. (Plate XXXV.)

Description.—It grows from twelve to eighteen inches high. The root is perennial, creeping. *Stem* erect, decumbent at the base, round, and generally roughish, bearing five or six leaves with *rough* striated sheaths, (the roughness is only felt from below upwards; smooth on the opposite direction); the upper sheath much longer than its leaf, crowned with a *long pointed ligule*. *Joints* smooth. *Leaves* thin, flat, acute, rough on both surfaces. *Inflorescence* panicled. *Panicle* erect, the branches rough and spreading, the lower ones generally in threes or fives. *Spikelets* ovate, compressed, of two to five awnless florets, the summit of the lowermost floret extending slightly beyond the large glume of the calyx. *Calyx* of two nearly equal acute glumes, (Fig. 1), the upper glume three-ribbed, the lower without lateral ribs, the dorsal rib of both, strongly toothed. *Florets* of two paleæ (Fig. 2), the outer palea of lowermost floret *five-ribbed*

* *Poa trivialis*, Linn. Koch, Smith, Hooker, Greville, Lindley.

(Fig. 4), the dorsal rib hairy on the lower half; the *marginal* and *intermediate ribs without hairs;* the base furnished with a delicate web suspending the calyx. Inner palea with two green marginal ribs minutely fringed.

—— —— *parviflora.* (Plate XXXV). This variety is very slender; the spikelets small, of one to two florets, and the stem generally smooth. Common in shady woods, and is frequently mistaken for *Poa nemoralis,* var. *angustifolia,* from which it differs in the sheaths being rough (when felt from below upwards), ligules long and pointed, and the outer palea with the marginal ribs not hairy;—whereas in *Poa nemoralis* the sheaths are smooth, the ligules very short and obtuse, and the marginal ribs of the outer palea hairy.

Obs.—Poa trivialis is readily distinguished from *Poa pratensis* in the *sheaths* being more or less rough; *ligule* long and pointed, and the *marginal ribs* of the outer palea without hairs;—whereas in *P. pratensis* the *sheaths* are mostly smooth; *ligule* obtuse, and the *marginal ribs* of the outer palea furnished with hairs. (Plate XXXI.)

From *Poa nemoralis,* in the *sheaths* being more or less rough to the touch; *ligule* long and pointed; *upper leaf* much shorter than its sheath; *outer palea* with the *marginal ribs* not hairy;—whereas in *P. nemoralis* the sheaths are smooth; the *ligule* very short and obtuse; *upper leaf* about equal in length to its sheath; *outer palea* with the marginal ribs hairy. (Plate XXXVI.)

From *Poa compressa* in the stem being round; *sheath* roughish; *ligule* long and pointed; *upper leaf* much shorter than its sheath; *outer palea* five-ribbed, the marginal ribs not hairy;—whereas in *P. compressa* the stem is very much compressed; *ligule* obtuse; *upper leaf* about equal in length to its sheath; *outer palea* three-ribbed, the marginal ribs hairy. (Plate XXXVII).

Poa trivialis is a most valuable grass to the agriculturist, when cultivated on moist rich sheltered soils, but on dry exposed situations it becomes unprofitable, and but little adapted for alternate husbandry. Mr Sinclair states, that the superior produce of this *Poa* over many other species, its highly nutritive qualities, the season in which it arrives at perfection, and the marked partiality which oxen, horses, and sheep have for it, are merits which distinguish it as one of the most valuable of those grasses which affect moist, rich soils, and sheltered

situations; but on dry exposed situations it is altogether inconsiderable, yearly diminishes, and ultimately dies off, not unfrequently in the space of four or five years. Its produce is always much greater when combined with other grasses, than when cultivated by itself; with a proper admixture it will nearly double its produce, though on the same soil, so much it delights in shelter. This grass should be cut for hay during the time when in seed, as the loss sustained by taking the crop at the time of flowering exceeds one-fourth of its value. To have land covered thickly with this grass, it will require rather more than seven pounds of seed to the acre.

Poa trivialis is common in moist and shady situations, and is found in every county throughout Scotland, England, and Ireland. It is also a native of Lapland, Norway, Sweden, Denmark, Prussia, Germany, France, Switzerland, Spain, Portugal, Italy, Asia, Iceland, and North America.

Flowers in the third week of June, and ripens its seed in the middle of July.

53. Poa nemoralis.*
Wood Meadow-Grass.

Specific Characters.—Florets webbed. Outer palea five-ribbed. Uppermost sheath not longer than its leaf. (Plate XXXVI.)

Description.—It grows from eighteen inches to two feet high. The root is perennial, creeping. *Stem* erect, slender, scarcely smooth, compressed; bearing five or six leaves with smooth striated sheaths; *the upper sheath not longer than its leaf, crowned with a very short obtuse ligule.* *Joints* about five, smooth; the first joint about half way up the stem, not covered by the second sheath. *Leaves* linear, narrow, acute, flat, rough on the edges and inner surface, smooth behind on the lower half. *Inflorescence* compound panicled. *Panicle* slightly drooping, the branches roughish, slender, spreading, the lower ones in pairs, threes, or fours. *Spikelets* ovate, acute, slightly compressed, of three or five awnless florets; the summit of the lowermost extending slightly beyond the large glume of the calyx. *Calyx* of two

* *Poa nemoralis*, Koch, Hooker, Greville, Leers. (*Poa nemoralis* of Smith has no web; I know not therefore to what species it can be referred).

nearly equal acute glumes (Fig. 1), three-ribbed, the dorsal rib toothed on the upper half. *Florets* of two paleæ (Fig. 2); the outer palea of lowermost floret five-ribbed (Fig. 4); the lower half of the dorsal and two marginal ribs hairy; the intermediate ribs without hairs; *the base of the floret furnished with a silky web suspending the calyx.* Inner palea a little shorter than the outer palea, furnished with two green marginal ribs, delicately fringed. The whole plant is of a light green.

—— —— *angustifolia*, a frequent variety, with the panicle erect; the leaves long and narrow; the first joint near the panicle; the spikelets small, of two florets; and the ligules scarcely perceptible. (Plate XXXVI).

Obs.—Poa nemoralis is distinguished from *Poa trivialis* in the *upper sheath* not being longer than its leaf; *ligule* very short and obtuse, and the outer palea with the *marginal ribs* hairy;—whereas in *P. trivialis* the *upper sheath* is much longer than its leaf, *ligule* long and pointed, and the *marginal ribs* of the outer palea not hairy. (See Plate XXXV).

From *Poa pratensis*, in the *upper sheath* not being longer than its leaf, with the *ligule* very short;—whereas in *P. pratensis* the *upper sheath* is much longer than its leaf, and the *ligule* prominent. (See Plate XXXI.)

From *Poa montana*, in the *florets* being webbed; *ligule* very short; *second sheath* not extending to the first joint;—whereas in *P. montana* the *florets* are not webbed; *ligule* prominent, and the *secoud sheath* extends beyond the first joint. (See Plate XXXIX).

From *Poa polynoda* in the *florets* being webbed; *ligule* very short, scarcely perceptible; *stem* but slightly compressed;—whereas in *P. polynoda* the *florets* are not webbed; *ligule* rather prominent; *stem* very much compressed. (See Plate XXXIX).

Poa nemoralis ranks amongst the superior permanent pasture grasses, producing a considerable deal of fine succulent and nutritive herbage, which horses, cows, and sheep are remarkably fond of. It will grow freely in exposed situations, but in its natural state is found only in shady places or woods of rich soil.

This is by no means a frequent grass throughout Scotland, although

common in certain localities. It is frequently met with in England and Ireland. It is also a native of Lapland, Norway, Sweden, Denmark, Prussia, Germany, France, Spain, Italy, North Asia, Iceland, and the United States. Its limit of altitude seems about 1500 feet above the sea.

Flowers in the third week of June, and ripens its seed in the last week of July.

54. Poa compressa. *

Flat-stalked Meadow-Grass.

Specific Characters.—Florets webbed. Outer palea three-ribbed; the marginal ribs hairy. (Plate XXXVII.)

Description.—Its usual height is about a foot. The root is perennial, creeping. *Stem* erect, decumbent at the base; scarcely smooth; *very much compressed;* rather stout, and somewhat contracted under the panicle; bearing four or five leaves, with smooth, striated sheaths; the upper sheath short, *about the length of its leaf, crowned with a short obtuse ligule. Joints* five, smooth. *Leaves* rather short, flat, acute; rough on the inner surface and edges, smooth behind. *Inflorescence* mostly simple panicled. *Panicle* somewhat unilateral, erect, spreading while flowering, close both before and afterwards; branches short and rough, generally in pairs, the lowermost rather remote. *Spikelets* ovate, acute, compressed, of five to seven florets; the summit of the lower floret scarcely extending beyond the large glume of the calyx. *Calyx* of two nearly equal acute glumes (Fig. 1), often tinged with purple; three-ribbed, toothed on the upper part of the central rib. *Florets* of two paleæ (Fig. 2); the outer palea of lowermost floret *three-ribbed,* the lower half of the dorsal and marginal ribs hairy; *the base furnished with a delicate web suspending the calyx* (Fig. 4). Inner palea with two green marginal ribs minutely fringed. The whole plant is of a darkish green.

Obs.—*Poa compressa,* from its very flat stem, short sheaths, three-ribbed outer palea, and webbed at the base, will readily be distinguished. It is more closely allied to *Poa polynoda* than to any other, but differs from it in the *lower florets* being webbed; *outer palea* three

* *Poa compressa,* Linn., Koch, Leers, Schrad. Smith, Hooker, Lindley.

ribbed; *first joint* about half-way up the stem;—whereas in *Poa polynoda* the *florets* are perfectly free; *outer palea* five-ribbed; *second joint* about half-way up the stem, and the first joint near the panicle. (Plate XXXIX.)

From *Poa pratensis*, in the *upper leaf* being about equal in length to its sheath; *stem* very much compressed, and contracted under the panicle; *outer palea* only three-ribbed;—whereas in *P. pratensis* the upper leaf is much shorter than its sheath; *stem* very seldom compressed; outer palea five-ribbed. (Plate XXXI.)

From *Poa nemoralis*, in the *ligule* of upper sheath being prominent; *panicle* somewhat rigid; *outer palea* only three-ribbed;—whereas in *P. nemoralis* the *ligule* is very short, scarcely perceptible; *panicle* long and slender; *outer palea* five-ribbed. (Plate XXXVI.)

From *Poa cæsia*, in the uppermost joint being about the centre of the stem; *florets* webbed; outer palea only three-ribbed;—whereas in *P. cæsia* the upper joint is situated near the base of the stem; *florets* perfectly free; *outer palea* five-ribbed. (Plate XL.)

Were it not for the small quantity of foliage that this grass produces, it would rank as one of the most valuable grasses, as it shoots its leaves early in spring, and possesses a large share of nutritive properties. It grows naturally on dry poor soils, and is found in stony places and wall-tops.

It is a frequent grass in Scotland, England, and Ireland, also a native of Norway, Sweden, Prussia, Germany, France, Switzerland, Italy, Russia, Greenland, Iceland, and the northern parts of North America. Attains an elevation of 3000 feet above the sea.

Flowers in the second week of July, and the seed is ripe about the middle of August.

55. Poa alpina.*

Alpine Meadow-Grass.

Specific Characters.—Florets not webbed. Outer palea three-ribbed. Glumes three-ribbed. Upper leaf folded, and shorter than its sheath. Rachis and branches rough, (Plate XXXVII.)

* *Poa alpina*, Hooker, Smith, Koch, Lind.

Description.—It grows from four inches to a foot in height. The root is perennial, fibrous, *tufted. Stem* round, smooth, erect, bearing two or three leaves with smooth striated sheaths; the upper sheath much longer than its leaf, crowned with a long pointed membranous ligule. (Fig 5.) Second sheath seldom extending as high as the first joint. *Joints* two, smooth. *Leaves* short, mostly flat, rough on the edges and inner surface, smooth and polished behind; upper leaf folded, compressed, *rounded behind the summit. Inflorescence* panicled. *Panicle* rather close, erect; branches rough, the lower ones generally in pairs. *Spikelets broadly ovate*, erect, very frequently viviparous, (Fig. 4), (that is, the inner palea transformed into small leaves,) usually of four awnless florets; the summit of the lower floret projecting beyond the calyx. *Calyx* of two broad, acute, equal glumes, (Fig. 1), three-ribbed, and minutely toothed on the keels. *Florets not webbed;* of two paleæ, (Fig 2); the outer palea of lowermost three ribbed, (Fig. 3); the lower-half of the dorsal and lateral ribs furnished with silky hairs. Inner palea rather shorter than the outer palea, membranous, with two green marginal ribs minutely fringed.

Obs.—*Poa alpina* somewhat resembles *Poa laxa*, but the *panicle* is more compact, erect; the *lower branches* much shorter; the *root* much tufted; *upper leaf* folded, compressed, and rounded behind the point; *spikelets* broadly ovate, approaching to cordate, and the radical leaves shorter and more obtuse:—whereas in *P. laxa* the *panicle* is slender and slightly drooping; the *lower branches* long; the *root* not tufted; *upper leaf* flat, lanceolate, and taper-pointed; *spikelets* oblong ovate, and the radical leaves linear, lanceolate. (See Plate XXXVIII.)

From *Poa cæsia*, in the *upper sheath* being much longer than its leaf; *ligule* long and pointed; and the *outer palea* three-ribbed;—whereas in *P. cæsia* the *upper sheath* is about equal in length to its leaf; *ligule* obtuse; and the *outer palea* five-ribbed. (See Plate XL.)

From *Poa pratensis*, in the *florets* not being webbed, and the *ligule* long and pointed;—whereas in *P. pratensis* the two lowermost florets are furnished at the base with a copious web suspending the calyx; and the *ligule* is rather short and obtuse. (See Plate XXXI.)

Although *Poa alpina* is naturally confined to the alpine regions

at an elevation of between 3000 and 4000 feet above the sea, it will, when cultivated in the low-land, thrive well, but not sufficiently so as to render it an object of agricultural attention. Hares and rabbits are remarkably fond of the leaves, which they crop close to the ground. It is a very early grass, coming into flower about the third week of May, and ripens its seed about the end of June.

It is found on several of the mountains in Perth, Forfar, Aberdeen, and Inverness; and in England, in the counties of Caernarvon and York. It is also a native of Lapland, Norway, Sweden, Germany, France, Switzerland, Italy, Russia, Greenland, Iceland, and the northern parts of North America; but has not been found in the United States.

56. Poa laxa.

Wavy Meadow-Grass.

Specific Characters.—Florets not webbed. Outer palea three-ribbed. Glumes three-ribbed. Upper leaf flat and shorter than its sheath. Rachis and branches rough. (Plate XXXVIII.)

Description.—It grows from six to twelve inches high. The root is perennial, fibrous, somewhat creeping. *Stem* round, smooth, and slender, bearing two or three leaves with smooth striated sheaths; the upper sheath much longer than its leaf, crowned with a *long acute ligule* (Fig 5), generally embracing the stem; second sheath frequently covering the first joint. *Joints* two, smooth; the upper joint nearer the root than to the panicle. *Leaves flat, linear, lanceolate, taper-pointed,* flaccid, roughish on the edges and inner surface, smooth behind. *Inflorescence* panicled. *Panicle* slightly drooping, the branches roughish and slender, the lower ones long and generally in pairs. *Spikelets oblong-ovate;* green or tinged with purple, frequently viviparous, of three awnless florets; the summit of the lowermost floret projecting beyond the large glume of the calyx. *Calyx* of two nearly equal acute glumes (Fig. 1), membranous at the margins; the inner glume three-ribbed; the outer without lateral ribs. *Florets not webbed;* of two paleæ (Fig. 2); the outer palea of lowermost floret *three-ribbed* (Fig. 3), the lower half of the ribs hairy, the

* *Poa laxa*, Hænk. Koch.

lateral ribs situated near the margins. *Inner palea* membranous, rather shorter than the outer palea, furnished with two green marginal ribs delicately fringed.

—— ——*flexuosa*, a variety most frequently viviparous. The branches of the panicle wavy, and the leaves mostly short. (Plate XXXVIII.)

Obs.—*Poa laxa* is distinguished from *Poa alpina*, in the panicle being more slender and somewhat drooping; the *root* not tufted; *upper leaf* flat and taper-pointed; and the *spikelets* oblong ovate;—whereas in *P. alpina* the panicle is compact, erect; *root* much tufted; *upper leaf* folded, compressed, and rounded behind the point; and the *spikelets* broadly ovate. (See Plate XXXVII.)

From *Poa montana*, in the *upper sheath* being much longer than its leaf, and the *ligule* long and pointed;—whereas in *P. montana* the *upper sheath* is shorter than its leaf, and the *ligule* is rather short and obtuse. (See Plate XXXIX.)

From *Poa annua*, in the *branches* of the panicle being rough, and the *outer palea* three-ribbed;—whereas in *P. annua* the *branches* are smooth and the *outer palea* five-ribbed. (See Plate XL.)

From *Poa nemoralis*, in the *upper sheath* being much longer than its leaf; *ligule* long and pointed, and the florets not webbed;—whereas in *P. nemoralis* the *upper sheath* is not longer than its leaf; *ligule* very short and obtuse, and the lower florets are distinctly webbed, suspending the calyx. (See Plate XXXVI.)

Poa laxa is a very rare British grass, found on Ben-Nevis, Inverness-shire, about 4300 feet above the sea. It is also a native of Lapland, Germany, Switzerland, Spitzbergen? and Greenland? Flowers in the last week of May, and ripens its seed about the end of June.

57. Poa polynoda.*

Silicious Meadow-Grass.

Specific Characters.—Florets not webbed. Upper sheath not longer than its leaf. Upper joint above the centre of the stem.

* *Poa polynoda*, Parnell. This grass is new to the British Flora, and does not appear to have been noticed by continental authors.

Second sheath not reaching to the first joint. Outer palea five-ribbed. Glumes acute, three-ribbed. (Plate XXXIX.)

Description.—It grows from twelve to eighteen inches high. The root is perennial, creeping. *Stem* ascending, procumbent at the base, compressed, scarcely smooth, bearing six or seven leaves, with short smooth striated sheaths; *the upper sheath about equal in length to its leaf*, situated far up the stem, crowned with a *short, obtuse ligule* (Fig 5); *second sheath not reaching to the first joint. Joints* six or seven, smooth; *the uppermost joint near the panicle. Leaves* mostly all on the stem, short, flat, acute, roughish on the edges and inner surface, smooth behind. *Inflorescence* panicled, erect, of an ovate-lanceolate form, with short rough branches, arranged on the rachis mostly in pairs. *Spikelets* small, *ovate*, of four or five awnless florets; the summit of the lowermost floret not extending beyond the large glume of the calyx. *Calyx* of two acute nearly equal glumes (Fig. 1), three-ribbed, the dorsal rib minutely toothed on the upper half. *Florets not webbed;* of two paleæ (Fig. 2); the outer palea of lowermost floret *five-ribbed* (Fig. 4); the lower half of the dorsal and marginal ribs but slightly hairy; the intermediate ribs naked and rather indistinct. Inner palea rather shorter than the outer palea, with two green marginal ribs delicately fringed. The whole plant is somewhat glaucous.

Obs.—*Poa polynoda* differs from *Poa cæsia*, in the *stem* bearing six or more joints; the *upper joint* near the panicle; *second sheath* not reaching to the first joint, and the summit of the lowermost floret not extending beyond the large glume of the calyx;—whereas in *P. cæsia* the *stem* bears but two joints; the *uppermost joint* situated near the base, leaving two-thirds of the stem naked; *second sheath* covering the first joint, and the summit of the lower floret projecting beyond the large glume of the calyx. (See Plate XL.)

From *montana*, in *panicle* being short and rigid; *upper joint* of the stem near the panicle; *summit* of the lower floret extending beyond the large glume of the calyx;—whereas in *P. montana* the panicle is long and slender; *upper joint* situated about the centre of the stem; *summit* of the lower floret not projecting beyond the calyx. (See Plate XXXIX.)

From *Poa compressa*, in the *florets* not being webbed, and the *outer palea* five-ribbed;—whereas in *P. compressa* the *lower florets* are dis-

tinctly webbed, suspending the calyx, and the *outer palea* three-ribbed. (See Plate XXXVII.)

From *Poa nemoralis*, in the *florets* not being webbed, and the *panicle* short and rigid;—whereas in *P. nemoralis* the *lower florets* are distinctly webbed, suspending the calyx, and the *panicle* is long and slender. (See Plate XXXVI.)

From *Poa pratensis*, in the *florets* not being webbed, and the *upper sheath* about equal in length to its leaf;—whereas in *P. pratensis* the *lower florets* are copiously webbed, and the *upper sheath* much longer than its leaf. (See Plate XXXI.)

It would be unprofitable to apply this grass to any agricultural purpose, as no description of cattle seems to eat it, the leaves being always found entire, while the surrounding foliage of other grasses are cropped close to the ground. This probably is owing to the large quantity of silicious matter contained in the sheaths and stems, which is considerably more than that usually found in other grasses, rendering the herbage hard and disagreeable to the mouths of cattle. When dry, it might form a substitute for fine sand-paper, and prove valuable to turners for polishing wood. The minute granular surface can be very perceptibly though disagreeably felt by drawing the stem through the teeth. It commences to flower in the last week of June, and ripens its seed about the third week of July.

The only localities as yet known for this grass are near Edinburgh, where it is occasionally found growing in small patches on rather dry stony soil.

Specimens are under cultivation in the Botanic Garden of Edinburgh.

58. Poa montana.*

Mountain Meadow-Grass.

Specific Characters.—Florets not webbed. Upper sheath not longer than its leaf. Second sheath extending beyond the first joint. Upper joint about the centre of the stem. Outer palea five-ribbed. Glumes acute, three-ribbed. (Plate XXXIX.)

Description.—It grows from twelve to eighteen inches high. The

* *Poa nemoralis montana*, Koch.

root is perennial, extensively creeping, throwing out stems from the lower joints. *Stem* erect, procumbent at the base, compressed, slightly roughish, bearing four or five leaves with somewhat roughish sheaths; the *upper sheath rather shorter than its leaf*, crowned with a *conspicuous obtuse ligule* (Fig. 5); *second sheath extending beyond the first joint. Joints* four, smooth, the upper joint about half-way up the stem. *Leaves* mostly all on the stem, flat, linear-lanceolate, taper-pointed, roughish on the edges and both surfaces, but more so on the inner surface; the lower leaves mostly withered. *Inflorescence* racemed or panicled. *Panicle* erect, close, slender; the branches rough, long, and slender, the lower ones single or in pairs. *Spikelets* few, erect, *lanceolate-ovate*, of two or three awnless florets; the summit of the lowermost floret not projecting beyond the large glume of the calyx. *Calyx* of two unequal acute glumes (Fig. 1), three-ribbed, dorsal rib minutely toothed on the upper part. *Florets not webbed;* of two paleæ (Fig. 2); the outer palea of lowermost floret *five-ribbed* (Fig. 4); the lower half of the dorsal and marginal ribs hairy, the intermediate ribs not hairy and rather indistinct. *Inner palea about one-fourth shorter* than the outer palea, membranous, with two green marginal ribs minutely fringed. The whole plant glaucous.

Obs.—Poa montana is closely allied to *Poa polynoda*, but differs from it in the *panicle* being long and slender. The *dorsal rib* of outer palea much more hairy, and the *second sheath* extending beyond the first joint;—whereas in *P. polynoda* the *panicle* is short and contracted; the *dorsal rib* of outer palea but slightly hairy, and the *second sheath* not extending to the first joint. (See Plate XXXIX.)

From *Poa cæsia*, (independent of the form of the panicle), in the *upper joint* being situated about the centre of the stem; the *root* extensively creeping, and the summit of the lower floret not protruding beyond the large glume;—whereas in *P. cæsia* the *upper joint* is very near the base; the *root* is fibrous and not creeping, and the summit of the lower floret protrudes beyond the calyx. (See Plate XL.)

From *Poa nemoralis*, in the *florets* not being webbed; the *ligules* very conspicuous; the *second sheath* extending beyond the first joint; —whereas in *P. nemoralis* the *lower florets* are distinctly webbed, sus-

pending the calyx; the *ligules* scarcely perceptible, and the *second sheath* not reaching to the first joint. (See Plate XXXVI.)

This grass proves to be an addition to the British Flora; first discovered by Dr Greville, who gathered several dozen specimens in 1835, on Ben-Lawers, Perthshire, at an elevation of about 3600 feet above the sea. As this is such a well-marked species, there is no difficulty in distinguishing it from the other Poas, and seems undoubtedly to be the *Poa nemoralis montana* of Koch, who describes it in his Synopsis Floræ Germaniæ et Helveticæ, in the following words: "Culmi graciles, *panicula rara, spiculis magnis* 3–5 floris *parce obsita;* rami paniculæ 1–3 spiculas gerentes, spiculæ tenuiter et longe pedicellatæ. Varietas insignis."

Flowers in July. Its agricultural merits are not known.

59. Poa cæsia.*

Glaucous Meadow-Grass.

Specific Character.—Florets not webbed. Uppermost joint near the base of the stem. Branches of the panicle rough. Glumes nearly equal, acute, the inner glume three-ribbed. Outer palea five-ribbed. (Plate XL.)

Description.—It grows from six to twelve inches high. The root is perennial, fibrous, woolly. *Stem* erect, flattish, slightly roughish towards the upper part, bearing two or three leaves with short smooth striated sheaths; upper sheath about equal in length to its leaf, remote from the panicle, *leaving two-thirds of the stem naked;* crowned with a distinct *obtuse ligule,* (Fig. 5); *second sheath extending beyond the first joint. Joints two, very remote from the panicle. Leaves* short, flat, acute, roughish on the inner surface and margins, smooth behind. *Inflorescence* panicled. *Panicle* erect, rather small, the branches rough, the lower ones in pairs. *Spikelets ovate,* of three or four awnless florets; *the summit of the lower floret extending beyond the large glume of the calyx. Calyx* of two broad acute nearly equal glumes, (Fig. 1), three-ribbed, the middle rib minutely toothed on the upper part. *Florets not webbed;* of two paleæ (Fig. 2); the outer

* *Poa cæsia,* Koch. *Poa glauca,* Smith.

palea of lowermost floret *five-ribbed* (Fig. 4); the lower half of the dorsal as well as the marginal ribs hairy; the intermediate ribs naked and rather indistinct. Inner palea nearly as long as the outer palea, with two green marginal ribs minutely fringed. The whole plant is more or less glaucous.

Obs.—*Poa cæsia* somewhat resembles *Poa alpina*, but differs from it in the *upper sheath* being about equal in length to its leaf. *Ligule* obtuse, and the *outer palea* five-ribbed;—whereas in *P. alpina* the *upper sheath* is much longer than its leaf. *Ligule* long and pointed, and the *outer palea* three-ribbed. (See Plate XXXVII.)

From *Poa polynoda*, in the *stem* bearing but two joints; *uppermost joint* situated near the root, leaving two-thirds of the stem naked; *second sheath* covering the first joint, and the *lowermost floret* projecting beyond the large glume of the calyx;—whereas in *P. polynoda* the *stem* has six or more joints; *upper joint* near the panicle; the *second sheath* not reaching to the first joint; and the summit of lowermost floret not projecting beyond the calyx. (See Plate XXXIX.)

From *Poa laxa*, in the *upper sheath* being about equal in length to its leaf; *ligule* obtuse; and the *outer palea* five-ribbed;—whereas in *P. laxa* the *upper sheath* is much longer than its leaf; ligule long and pointed; and the *outer palea* three-ribbed. (See Plate XXXVIII.)

From *Poa montana*, in the *uppermost joint* being situated near the base of the stem; *root* fibrous, and the summit of the lower floret projecting beyond the large glume of the calyx;—whereas in *P. montana* the *upper joint* is situated about the centre of the stem; the *root* is extensively creeping; and the summit of the lower floret does not project beyond the calyx. (See Plate XXXIX.)

Among the *Poas* which are webbed, *Poa cæsia* is distinguished from *Poa nemoralis*, in the *florets* not being webbed; *upper joint* being near the base of the stem; and the *second sheath* extending beyond the first joint;—whereas in *P. nemoralis* the *lowermost florets* are distinctly webbed, suspending the calyx; *uppermost* joint placed about the centre of the stem; and the *second sheath* does not extend to the first joint. (See Plate XXXVI.)

From *Poa compressa*, in the *florets* not being webbed, and the *outer palea* five-ribbed;—whereas in *P. compressa* the *lower florets* are

distinctly webbed, suspending the calyx, and the *outer palea* three-ribbed. (See Plate XXXVII.)

From *Poa pratensis*, in the *florets* not being webbed, and the *upper sheath* about equal in length to its leaf;—whereas in *P. pratensis* the *lower florets* are distinctly webbed, suspending the calyx; and the *upper sheath* much longer than its leaf. (See Plate XXXI.)

This is a rare grass, found on Ben-Lawers and the Clova mountains; is also a native of Switzerland and the Arctic regions. It possesses no particular merits worthy the notice of agriculturists.

Flowers in the third week of June, and ripens its seed about the end of July.

60. Poa annua.*

Annual Meadow-Grass.

Specific Characters.—Florets not webbed. Outer palea five-ribbed. Leaves smooth on both surfaces. Rachis and branches smooth. (Plate XL.)

Description.—It grows from five to fifteen inches high. The root is perennial, somewhat creeping, throwing out fibres at the lower joints. *Stem* ascending, often procumbent at the base, flattish, smooth, bearing four or five leaves, with smooth compressed sheaths; the upper sheath longer than its leaf, crowned with a thin membranous somewhat acute ligule. *Joints* about four, smooth. *Leaves* of a light-green, sword-shape, flat and flaccid, *frequently crumpled at the margins*, smooth on both surfaces, rough at the edges. *Inflorescence* compound panicled. *Panicle* erect, in its outline of a triangular form, spreading, the branches smooth, mostly in pairs, inclining to one side, leaving the smooth rachis visible its whole length behind. *Spikelets* ovate-oblong, usually of five to eight awnless florets, frequently variegated with green, white, and purple; the summit of the lowermost floret extending beyond the large glume of the calyx. *Calyx* of two unequal acute glumes (Fig. 1), three-ribbed, the dorsal rib minutely toothed on the upper part. *Florets not webbed*, of two paleæ, (Fig. 2); the outer palea of lowermost floret

* *Poa annua*, Linn. Smith, Hooker, Greville, Koch.

five-ribbed, all the *ribs smooth*, without hairs, except the lower half of the dorsal rib, which is furnished with a few delicate silky hairs (Fig. 4). *Inner palea* rather shorter than the outer palea, membranous, with two green marginal ribs delicately fringed. *Filaments* three, capillary. *Anthers* short, pendulous, notched at each end. *Styles* two, distinct, short, naked. *Stigmas* prominent, feathery. *Ovarium* ovate, glossy, somewhat wrinkled. *Scales* membranous, broad, acute. (Fig. 5.)

Obs.—This grass in its external aspect is very similar to some varieties of *Poa pratensis*, but is readily distinguished in the *florets* not being webbed, and the *outer palea* with no hairs on the lateral ribs; —whereas in *P. pratensis* the lower florets are distinctly webbed, and the marginal ribs of the outer palea are furnished with hairs. (See Plate XXXI.)

From *Poa laxa* and *Poa alpina* in the branches of the panicle being smooth, and the outer palea distinctly five-ribbed;—whereas in *P. laxa* and *P. alpina* the branches are rough, and the outer palea only three-ribbed. (See Plates XXXVII. and XXXVIII.)

—— —— *serica*, a common variety, with plain short leaves. Ligule prominent, very thin and obtuse. Spikelets usually of three florets. The two lateral ribs on each side of the outer palea covered with white silky pubescence; in other respects the same as *P. annua*. Frequent on moist marshy soil. (Plate XLI.)

Poa annua, one of the commonest of all our grasses, flowering throughout the whole summer, growing on any kind of soil, in every situation from the low wet meadow to the dry mountain top, at an elevation of between 3000 and 4000 feet above the sea. It produces an early herbage, which cattle are fond of, especially cows, but its being an annual, and often destroyed by a continuance of dry weather, render it unprofitable to the farmer for cultivation.

It is a common grass throughout Britain, also a native of Lapland, Norway, Sweden, Denmark, Germany, France, Spain, Portugal, Switzerland, Italy, North Africa, North and South America, and North Asia.

61. Poa distans.*

Reflexed Meadow-Grass.

Specific Characters.—Florets not webbed. Rachis and branches rough. Spikelets linear. Glumes three-ribbed. Outer palea obtuse, five-ribbed. Upper sheath longer than its leaf. (Plate XLI.)

Description.—It grows from twelve to eighteen inches high. The root is perennial, fibrous. Stem erect, round, smooth, frequently decumbent at the base; bearing four leaves with smooth striated sheaths; the upper sheath longer than its leaf, crowned with an obtuse ligule; second sheath most frequently reaching beyond the first joint. *Joints* three, smooth. *Leaves* mostly flat, acute, very seldom folded, roughish on the inner surface, smooth behind. *Inflorescence* compound panicled. *Panicle* erect, with slender *rough branches* arranged on the rachis, at certain distances, in pairs, threes, or fives: *the lower branches ultimately becoming rigidly bent downwards,* assuming a very striking appearance. In the early stage of growth the branches are erect and close. *Spikelets linear* (Fig. 3); when young, somewhat elliptical, usually of five obtuse florets; the summit of the lowermost floret extending considerably beyond the larger glume of the calyx. *Calyx* of two unequal membranous obtuse glumes, (Fig. 1,) *three-ribbed;* the outer glume rather more than half the length of the inner one. *Florets not webbed*; of two paleæ, (Fig. 2); the outer palea of lowermost floret *five-ribbed, the middle rib not extending to the summit,* (Fig. 4); smooth and slightly hairy at the base; lateral ribs naked. Inner palea about equal in length to the outer palea, with two marginal ribs delicately fringed.

Obs.— *Poa distans* is closely allied to *Poa maritima,* but differs from it in the *spikelets* being smaller, and the *rachis* and branches rough to the touch;—whereas in *P. maritima* the *rachis* and *branches* are quite smooth to the touch. (See Plate XLII.)

From *Poa procumbens,* in the *branches* of the panicle spreading, the lower ones ultimately becoming deflexed and scarcely unilateral. The *ribs* of the glumes not prominent, and the *dorsal rib* of the outer

* *Poa distans,* Linn., Hooker. *Glyceria distans,* Smith, Koch. *Festuca distans,* Kunth. *Poa retroflexa,* Curtis.

palea not reaching to the summit;—whereas in *P. procumbens* the *panicle* is more or less close; the *branches* never deflexed; unilateral, leaving the rachis behind perfectly bare. The *ribs* of the glumes very prominent, and the *dorsal rib* of the outer palea extending slightly beyond the summit. (See Plate XLII.)

From *Poa trivialis*, in the *sheaths* being smooth to the touch; *ligule* obtuse; *spikelets* linear; florets not webbed;—whereas in *P. trivialis* the *sheaths* are roughish to the touch; *ligule* long and pointed; *spikelets* ovate; *florets* distinctly webbed. (See Plate XXXV. Figs. 1 and 2.)

From *Poa pratensis*, in the *spikelets* being linear; *florets* not webbed; *glumes* obtuse and smooth on the keels;—whereas in *P. pratensis* the *spikelets* are ovate; *florets* copiously webbed; *glumes* acute and minutely toothed on the upper part of the keels.

From *Poa annua*, in the inner surface of the leaves and the branches of the panicle being very *rough* to the touch;—whereas in *P. annua* the inner surface of the leaves and the branches of the panicle are perfectly smooth to the touch.

Poa distans is said to rank among the most inferior of the British grasses for agricultural purposes, and is therefore not to be recommended. It is a rare grass in Scotland, found in Forfar and North Queensferry; but in England it is more frequently met with in the counties of Northumberland, Durham, York, Notts, Flints, Denbigh, Worcester, Beds, Cambridge, Kent, Sussex, Somerset, and Devon; also a native of Norway, Sweden, Prussia, Germany, Switzerland, France, and Italy. Not found in America.

Flowers in the first week of July, and ripens its seed in the early part of August.

62. Poa maritima. *

Creeping Sea Meadow-Grass.

Specific Characters.—Florets not webbed. Upper sheath longer than its leaf. Spikelets linear. Outer palea five-ribbed. Glumes

* *Poa maritima*, Linn., Hooker, Greville. *Glyceria maritima*, Smith, Koch. *Festuca thalassia*, Kunth.

three-ribbed. Branches and rachis smooth to the touch. Leaves rough on the inner surface. (Plate XLII.)

Description.—It grows from six to twelve inches high. The root is perennial, *creeping.* *Stem* erect, round and smooth, decumbent at the base; bearing three or four leaves with smooth tumid sheaths; the upper sheath longer than its leaf, crowned with an obtuse decurrent ligule; second sheath most frequently reaching beyond the first joint. *Joints* four, smooth. *Leaves* mostly *folded* and compressed, very seldom flat, roughish on the inner surface, smooth behind. *Inflorescence* mostly simple panicled, seldom compound. *Panicle* erect, close, spreading whilst in flower, unilateral, leaving the rachis behind bare; *branches smooth to the touch,* arranged on the rachis in pairs, threes, or fives; the lower branches never deflexed. *Spikelets* linear (Fig. 3), of six to ten florets; the summit of the lowermost floret extending considerably beyond the large glume of the calyx. *Calyx* of two unequal membranous glumes (Fig. 1), *three-ribbed;* the outer glume rather more than half the length of the inner one. *Florets not webbed,* of two paleæ (Fig 2); the outer palea of lowermost floret *terminating in an acute point;* five-ribbed (Fig 4), smooth above, and slightly hairy at the base. Inner palea about equal in length to the outer palea, with two green marginal ribs delicately fringed.

Obs.—*Poa maritima* is very likely to be confounded with some varieties of *Poa distans,* especially those in which the branches are not deflexed; it is, however, distinguished by the rachis and branches being smooth to the touch. The *root* creeping. *Central rib* of the outer palea extending to the very summit, giving an acute appearance to the palea. *Leaves* almost always folded and scarcely ever flat;—whereas in *P. distans* the rachis and branches are rough; the *root* fibrous; *central rib* of the outer palea not extending to the summit, leaving the upper membranous part obtuse; *leaves* almost always flat, and scarcely ever folded. (See Plate XLI.)

From *Poa procumbens,* in the *root* being creeping; *rachis* and branches smooth to the touch; *leaves* narrow and almost always folded; *ribs* of the glumes distinct but not prominent; *central rib* of the outer palea not extending beyond the summit;—whereas in *P. procumbens* the *root* is fibrous; *rachis* and branches rough; *leaves*

broad and almost invariably flat ; *ribs* of the glumes very prominent, and the *central rib* of the palea extending slightly beyond the summit. (See Plate XLII.)

Poa maritima grows naturally near the sea, especially in salt marshes. It occurs in many places along the coasts of Scotland and Ireland. In England it is found on the coasts of Northumberland, Durham, Anglesea, Glo'ster, Norfolk, Kent, Sussex, Somerset, and Devon ; also a native of Lapland, Norway, Sweden, Germany, France, Italy, Iceland, and North America.

Flowers in the first week of July, and ripens its seed early in August.

63. Poa procumbens. *

Procumbent Sea Meadow-Grass.

Specific Characters.—Florets not webbed. Glume with three very prominent ribs. Outer palea five-ribbed, the middle rib extending beyond the summit. Rachis and branches rough to the touch. Upper sheath longer than its leaf. (See Plate XLII).

Description.—It grows from three to fifteen inches long. The root is *annual.* *Stem* more or less prostrate, round, smooth, and polished ; bearing three leaves with smooth striated sheaths ; the upper sheath much longer than its leaf, situated near the panicle, crowned with an oblong membranous ligule ; second sheath extending beyond the first joint. *Joints* three, smooth. *Leaves* flat, ribbed, rough on the inner surface, smooth behind at the base, sharp at the points. *Inflorescence* simple or compound panicled. *Panicle* mostly close, of a lanceolate form, unilateral, leaving the rachis behind perfectly bare ; *the branches rough,* slightly spreading while in flower, but *never deflexed. Spikelets linear* (Fig. 3), generally of five florets, the summit of the lowermost floret extending considerably beyond the large glume of the calyx. *Calyx* of two unequal membranous obtuse glumes (Fig. 1), with *three prominent ribs,* the large glume occasionally with a short additional rib. *Florets* of two paleæ (Fig. 2) ; the outer palea of lowermost floret five-ribbed, slightly hairy at the base ; the *middle rib ex-*

* *Poa procumbens,* Curtis, Hooker. *Glyceria procumbens,* Smith. *Sclerochloa procumbens,* Lindley.

tending very slightly beyond the summit of the palea, (Fig. 4.) Inner palea rather shorter than the outer palea, with two green marginal ribs delicately fringed. *Styles* very short. *Stigmas* branched. The whole plant is more or less glaucous.

Obs.—Poa procumbens differs from *Poa maritima,* in the *root* being annual and fibrous; *rachis* and branches rough to the touch; *leaves* broad and almost invariably flat; *ribs* of the glumes very prominent; and the *central rib* of the outer palea extending slightly beyond the summit; whereas in *P. maritima* the *root* is creeping and perennial; *rachis* and branches smooth to the touch; *leaves* narrow and almost always folded; *ribs* of the glumes distinct but not prominent; and the *central rib* of the outer palea not extending beyond the summit. (Plate XLII.)

From *Poa distans,* in the *panicle* being close; *branches* unilateral, leaving the rachis behind perfectly bare; never deflexed; *ribs* of the glumes very prominent, and the *dorsal rib* of the outer palea extending slightly beyond the summit;—whereas in *P. distans* the *panicle* is spreading, the *lower branches* ultimately becoming deflexed; *ribs* of the glumes distinct but not prominent; and the *dorsal rib* of the outer palea not reaching to the summit. (Plate XLI.)

From *Poa rigida* and *Poa loliacea,* in the *glumes* being obtuse and having distinct lateral ribs;—whereas in *P. rigida* and *P. loliacea* the *glumes* are acute and without lateral ribs. (Plate XLIII.)

Poa procumbens is found growing in waste ground near the sea. Seldom met with either in Scotland or Ireland; more common in England, in Durham, York, Glo'ster, Norfolk, Suffolk, Essex, Sussex, Dorset, and Devon; also a native of Germany and France. Not found in Lapland or America.

Flowers in the second week of July, and ripens its seed in the middle of August.

64. Poa rigida. *

Hard Meadow-Grass.

Specific Characters.—Florets not webbed. Summit of the upper glume on a level with the base of the third floret. Glumes without lateral ribs. (Plate XLIII.)

Description.—It grows from three to five inches high. The root is annual, fibrous, woolly. *Stem* mostly erect, the lower part decumbent, smooth, round, and finely striated, bearing four or five leaves with smooth striated sheaths; the upper sheath shorter than its leaf, crowned with a long pointed ligule. *Joints* three or four, smooth. *Leaves* linear, narrow, taper-pointed, involute, roughish on the upper part, smooth below. *Inflorescence* simple panicled. *Panicle* erect, rigid, of a lanceolate form, with very short, roughish, rigid, unilateral branches, leaving the rachis behind perfectly bare. *Spikelets linear*, compressed, usually of seven florets (Fig. 3), the summit of the lower floret extending but slightly beyond the large glume of the calyx. *Calyx* of two acute unequal glumes (Fig. 1), *without lateral ribs*. *Florets* of two paleæ (Fig. 2); the outer palea of lowermost floret *five-ribbed;* the marginal ribs broad, with a white line down the centre; the intermediate ribs scarcely perceptible; the dorsal rib toothed on the upper part, and *protruding slightly beyond the summit of the palea* (Fig, 4). Inner palea rather shorter than the outer, with two green marginal ribs but slightly fringed on the upper part.

Obs.—Poa rigida, on account of its small size and rigid appearance, can only be mistaken for *Poa loliacea*, and on some occasions these two species so very much resemble each other, that they can scarcely be distinguished by any constant character. The only character that I have been able to discover by which they can at all times be distinguished from one another is derived from the spikelet, that is, in *Poa rigida* the summit of the upper glume is on a level with the base of the *third* floret;—whereas in *Poa loliacea* it is on a level with the base of the *fourth* floret. This character, however trivial it may appear, will be found constant.

* *Poa rigida*, Linn., Hooker, Greville. *Glyceria rigida*, Smith. *Sclerochloa rigida*, Link., Lindley. *Festuca rigida*, Kunth., Koch.

Poa rigida being so diminutive a plant, it would be unprofitable to apply it to any agricultural purpose. Hares and rabbits, it is said, are fond of the leaves. It grows on walls, rocks, and dry barren soils. Frequent on the coast of Fife, and in the neighbourhood of Edinburgh, especially on Arthur's Seat and Salisbury Craigs. Not uncommon in England and Ireland; also a native of Germany, France, Switzerland, Italy, and North Africa. Not found in America, or further north than altitude 59°. Its limit of altitude is about 500 feet above the sea.

Flowers in the second week of July, and ripens its seed in the middle of August.

65. Poa loliacea. *

Spiked Meadow-Grass.

Specific Characters.—Florets not webbed. Summit of the upper glume on a level with the base of the fourth floret. Glumes without lateral ribs. (Plate XLIII).

Description.—It grows from two to five inches high. The root is annual, fibrous. *Stem* ascending, slightly curved, stout, smooth, and striated; bearing three or four leaves with smooth striated sheaths; the upper sheath about equal in length to its leaf, crowned with an *obtuse* ragged ligule; the lower sheaths shorter than their leaves. *Joints* two or three, smooth. *Leaves* linear, smooth, convolute when dry. *Inflorescence* mostly racemed, approaching to a spike. *Raceme* erect or with a gentle curve. *Spikelets* of an oblong-ovate, on very short and stout footstalks, arranged alternately on each side of the rough rachis, all directed to one side, nearly covering the rachis in front, and leaving it completely bare behind; of from eight to twelve florets; the summit of the lowermost floret scarcely extending beyond the large glume of the calyx. *Calyx* of two somewhat acute glumes, (Fig. 1), nearly equal, *without lateral ribs;* the dorsal rib strongly marked. *Florets* of two paleæ (Fig. 2); the outer palea of lowermost floret *five-ribbed*; the marginal ribs broad, with a white line down the centre; the intermediate ribs scarcely perceptible; the dorsal rib

* *Poa loliacea*, Huds. Koch. *Triticum loliaceum*, Hooker, Smith. *Catopodium loliaceum*, Lindley.

toothed on the upper part, and protruding slightly beyond the summit of the palea (Fig. 4). Inner palea about equal in length to the outer palea, with two green marginal ribs minutely toothed.

Obs.—Poa loliacea, from its great similarity in structure and habit to *Poa rigida*, is on some occasions with difficulty distinguished from it, particularly when the panicle of the former becomes branched, which is sometimes the case. The most constant character, although rather minute, is in the summit of the upper glume in *Poa loliacea* reaching to the base of the fourth floret;—whereas in *Poa rigida* it reaches only to the base of the third floret.

This grass is of no agricultural utility. Grows in small tufts along the sea-coast on rocks and hard sandy soils. Frequent on the coast of Fife; occasionally met with in Ireland; more frequent in England, in the counties of Northumberland, Durham, Cumberland, Lancashire, York, Flints, Anglesea, Glamorgan, Cambridge, Norfolk, Suffolk, Essex, Kent, Sussex, Hants, Dorset, Somerset, Devon, and Cornwall; also a native of France, Germany, Portugal, Spain, and Italy. Not found in America, or further north than latitude 59°.

Flowers in the second week of July, and ripens its seed in the middle of August.

66. Poa sylvatica.*

Wood Reed Meadow-Grass.

Specific Characters.—Florets not webbed. Outer palea three-ribbed, rough; the dorsal rib serrated its whole length. (Plate XLIV.)

Description.—It grows from two to three feet high. The root is perennial, creeping, tufted. *Stem* round, erect, and slender, slightly roughish to the touch, bearing three or four leaves, with *rough* striated sheaths; the upper sheath longer than its leaf, crowned with a prominent obtuse membranous ligule; lower sheaths shorter than their leaves; *the radical extremity of the stem imbricated with large, broad, acute scales*, of a brownish colour, more or less polished, (Fig. 6.) *Joints* four, smooth; the two uppermost naked. *Leaves*

* *Poa sylvatica*, Pollich. *Festuca calamaria*, Smith, Hooker. *Schedonorus sylvaticus*, Lindley.

broad, acute, flat, polished, of a light-green, ribbed, and *roughish on both surfaces;* the upper leaf smaller than those below. *Inflorescence* compound panicled. *Panicle* slightly drooping on the upper part, leaning mostly to one side, spreading while in flower; the branches slender, roughish upwards; arising from the rachis in pairs. *Spikelets* numerous, small in comparison with the size of the plant; of three awnless florets; becoming very deciduous when in seed. *Calyx* of two unequal, *narrow*, acute, membranous glumes (Fig. 1,) *without lateral ribs; a little apart at the base, and never overlapping. Florets* of two paleæ (Fig. 2), the outer palea of lowermost floret *rough, acute, three-ribbed, the dorsal rib serrated the whole length, the lowermost serrations the most prominent. Inner palea* roughish, about equal in length to the outer palea, membranous, and minutely fringed at the margins. Pedicle of the second floret rough.

Obs.—Poa sylvatica is distinguished from the genus *Festuca* (in which genus it is placed in Hooker's British Flora,) in the radical leaves being much broader than the upper leaf of the stem; *ligule* prominent; *outer palea* acute but membranous at the summit;—whereas in *Festuca* the radical leaves are never broader than those of the stem, and almost always much narrower; *ligule* exceedingly short; *outer palea* more or less awned at the summit.

It is distinguished from *Bucetum pratense* in the ligule being prominent; *leaves* roughish on both surfaces; *spikelets* of only three florets; *dorsal rib* of outer palea rough its whole length;—whereas in *B. pratense* the ligule is exceedingly short; *leaves* perfectly smooth on the under surface; *spikelets* of not less than five florets; dorsal rib of outer palea perfectly smooth its whole length. (Plate XLVI.)

From *Poa pratensis, Poa trivialis,* and *Poa nemoralis,* in the *glumes* being narrow, without lateral ribs; *base* of florets perfectly free of hairs; *outer palea* only three-ribbed—instead of the glumes being rather broad and three-ribbed; *florets* distinctly webbed; *outer palea* five-ribbed.

Poa sylvatica, from its broad tender leaves, which are produced in great abundance, and being much sought after by cows and horses, render this grass worthy of agricultural attention. It grows in damp

shady woods of rich soils, and is of rather rare occurrence. Found in Kinross, Dumbarton, Perth, and Roslin wood; occasionally in Ireland. In England, in the counties of Westmoreland, Worcester, and Sussex; also a native of France and Germany. Not found in America. Its limit of altitude is about 700 feet above the sea.

Flowers in the second week of July.

67. Poa aquatica.*

Reed Meadow-Grass.

Specific Characters.—Florets not webbed. Spikelets ovate. Outer palea seven-ribbed. (Plate XLIV.)

Description.—It grows from *three to six feet high.* The root is perennial, creeping. *Stem* erect, stout, smooth, striated, a little compressed; bearing seven or eight leaves with slightly roughish sheaths; the upper sheath longer than its leaf, crowned with a short obtuse ligule. *Joints* about seven, smooth. *Leaves* long, broad, and flat, terminating in a rough point; the inner surface smooth; the margins rough; the central rib on the under surface, which is also rough, extends down the sheath. *Inflorescence* compound panicled. *Panicle* erect, large; the branches rough, arranged alternately on the rachis in half whorls. *Spikelets* numerous, of four to eight florets, erect, of a brownish tinge; the upper ones large and ovate, the lower ones smaller and more linear. *Calyx* of two unequal membranous obtuse glumes (Fig. 1,) without lateral ribs. *Florets not webbed,* of two awnless paleæ (Fig. 2); the outer palea of lowermost floret *seven-ribbed,* the dorsal rib extending to the very summit, *minutely toothed the whole length;* the lateral ribs more or less rough, but without hairs. Inner palea rather shorter than the outer, bifid, furnished with two green marginal ribs minutely fringed on the upper half. *Stigmas* compound, feathery. *Styles* a little distant, longer than the stigmas.

Poa aquatica, from its large size and broad leaves, cannot be mistaken for any of the other *Poas;* and if we pay attention to the form of the awnless spikelets, I cannot see with what Scottish grass it can be confounded.

* *Poa aquatica,* Linn. Hooker, Greville. *Glyceria aquatica,* Smith. *Hydrochloa aquatica,* Lindley.

It differs from *Catabrosa aquatica,* with which it has occasionally been confounded, in the branches of the panicle being rough to the touch; *spikelets* of four to eight florets;—whereas in *C. aquatica* the branches are perfectly smooth, and the *spikelets* never contain more than two florets, independent of many other characters.

Mr Sinclair informs us that this grass contains more nutritive matter at the time of flowering than at the time the seed is ripe, in the proportion of 19 to 17; and that it contains a greater proportion of sugar than exists in any of the superior pasture grasses. It grows naturally in wet places on the banks of rivers, streams, and margins of ponds, and is recommended for cultivation in those low flat situations which do not admit of being sufficiently drained. On the banks and little islands of the Thames, where this grass is generally mown twice in the year for hay, it affords abundant crops of valuable winter fodder, which cows and horses are fond of.

Poa aquatica is found in Dumbarton, Perth, Forfar, and near Edinburgh; occasionally in Ireland. In England, in the counties of Northumberland, Durham, York, Notts, Cheshire, Worcester, Glo'ster, Warwick, Leicester, Oxon, Beds, Cambridge, Norfolk, Suffolk, Middlesex, Surrey, Kent, Sussex, Somerset, and Devon; also a native of Norway, Sweden, Germany, France, Italy, Russia, and North America.

Flowers in the second week of July, and ripens its seed in the middle of August.

68. Poa fluitans.*

Floating Meadow-Grass.

Specific Characters.—Florets not webbed. Spikelets long and linear. Outer palea seven-ribbed. (Plate XLV.)

Description.—It grows from fifteen inches to two feet high. The root is perennial, creeping. *Stem* erect, round, and smooth, the lower part decumbent; bearing six or seven leaves with roughish, finely striated sheaths; the upper sheath longer than its leaf, crowned with

* *Poa fluitans,* Hooker, Greville. *Glyceria fluitans,* Smith, Lindley. *Festuca fluitans,* Linn.

a long ragged pointed ligule ; the second sheath extending beyond the first joint. *Joints* about seven, smooth. *Leaves* rather long and linear, roughish on both surfaces, the lower ones flat, the upper ones generally folded, compressed, the central rib on the back extending down the sheath. *Inflorescence* mostly simple panicled. *Panicle* nearly erect, long and slender, with slender roughish branches arranged alternately on the rachis mostly in pairs of unequal lengths, for the most part erect, but while flowering strongly divaricated for a time. *Spikelets* few, *long and linear*, (Fig. 3), variegated with green and white, of six to fourteen florets ; the summit of the lower floret extending considerably beyond the large glume of the calyx. *Calyx* of two very unequal, obtuse, membranous glumes (Fig. 1) *without lateral ribs. Florets not webbed*, of two paleæ (Fig. 2), the outer palea of lowermost floret *seven-ribbed ;* the dorsal rib scarcely extending to the summit, *minutely toothed the whole length ;* the lateral ribs more or less rough, but without hairs. Inner palea rather shorter than the outer, bifid, furnished with two green marginal ribs minutely fringed on the upper half.

Obs.—Poa fluitans, from the general appearance of the slender panicle and long linear spikelets, can scarcely be confounded with any of the other *Poas.* The only grass that it can well be mistaken for is *Bucetum loliaceum*, but is readily distinguished from it, in the outer palea having seven ribs, and the dorsal rib minutely toothed the whole length ;– whereas in *B. loliaceum* the outer palea has but five ribs and the dorsal rib perfectly smooth ; independent of many other characters.

This grass grows naturally in wet or muddy places, in ditches, ponds, and margins of rivulets, and will bear cultivation on moderately dry grounds as a permanent pasture grass, and yield a considerable produce. Cattle will eat it, but there are many grasses they like better. In several parts of Germany, this grass is cultivated for the seeds, which form the manna-croup of the shops, and are considered a delicacy in soups and gruels. Birds and trout, it is said, are fond of the seeds, which, when ground into meal, make bread very little inferior to that made from wheat.

Poa fluitans is common throughout Scotland, England, and Ireland; also a native of Norway, Sweden, Germany, Switzerland, France, Spain, Portugal, Italy, North Africa, New Holland, and North America.

Flowers in the third week of June, and ripens its seed about the end of July or beginning of August.

69. *Bucetum loliaceum.* *

Slender Fescue-Grass.

Specific Character.—Infloresence racemed. (Plate XLV.)

Description.—It grows from one to two feet high. The root is perennial, fibrous. *Stem* erect, smooth, round and striated, bearing four or five leaves with smooth striated sheaths; upper sheath much longer than its leaf; crowned with a very short, slightly decurrent ligule, embracing the stem more on the one side than on the other. *Joints* three or four, smooth; the first and second rather remote. *Leaves* lanceolate, flat, acute, upper leaf smaller than those below, scabrous at the point, rough on the inner surface, and smooth at the back. *Inflorescence* racemed, having a spiked appearance. *Raceme* about one-third the length of the stem; the rachis flattish, and more or less scabrous, leaning slightly to one side. *Spikelets* of an acute oval form, arranged in two opposite rows along the rachis, on short footstalks; sometimes two spikelets arise from the same base. *Calyx* of two unequal smooth glumes (Fig. 1), containing from six to ten awnles florets; the upper glume three-ribbed; the lower one without lateral ribs. *Florets* of two paleæ (Fig. 2), the outer palea of lowermost floret nearly twice the length of the calyx, five-ribbed, the lateral ribs more conspicuous on the upper part, the dorsal rib not extending quite to the summit. *Inner palea* linear, pointed, membranous, furnished with two green marginal ribs, minutely fringed.

Obs.—This grass is distinguished from *Lolium perenne*, (which it somewhat resembles in its general appearance), in having two glumes, and the spikelets more or less pedunculated;—whereas in *L. perenne* the spikelets are perfectly sessile, and the calyx composed of but one glume. (See Plate LXV.)

* *Bucetum loliaceum*, Parnell. *Festuca loliacea*, Smith, Hooker, Greville, Koch.

From *Poa fluitans*, in the upper glume having three ribs; outer palea five-ribbed, with the dorsal rib perfectly smooth;—whereas in *P. fluitans* the upper glume has but one rib; outer palea seven-ribbed, with the dorsal rib minutely toothed its whole length.

From *Bucetum pratense* in the inflorescence being racemed;—whereas in *B. pratense* the inflorescence is simple panicled. (Plate XLVI.)

From genus *Festuca* (where this grass was formerly placed), in the leaves of the root being broader than those of the stem; *florets* not awned; *outer palea* membranous at the summit;—whereas in *Festuca* the leaves of the root are generally narrower than those of the stem; *florets* awned from the extreme summit.

Bucetum loliaceum grows naturally in moist, rich meadows, and forms a good permanent pasture grass, superior to rye-grass (*Lolium perenne*); but as it produces but a small quantity of seed, and that generally imperfect, the cultivation of this grass by seed is impracticable. It may be propagated by transplanting the roots, but this would incur greater labour and expense than the merits of the grass warrant.

It is a frequent grass in Scotland, England, and Ireland; also a native of Germany, France, and Italy. Not found in America.

Flowers in the second week of July; the seeds seldom attain to perfection.

70. Bucetum pratense. *

Meadow Fescue-Grass.

Specific Character.—Panicle simple. (Plate XLVI.)

Description.—It grows from fifteen inches to two feet high. The root is perennial, fibrous. *Stem* erect, round, smooth and striated; bearing four or five leaves, with smooth striated sheaths; the upper sheath much longer than its leaf, crowned with a very short obtuse ligule, decurrent on one side. *Joints* four, smooth, the first and second very remote. *Leaves* lanceolate, acute, flat, scabrous at the points,

* *Bucetum pratense*, Parnell. *Festuca pratensis*, Koch, Smith, Hooker, Greville. *Schedonorus pratensis*, Lindley.

roughish on the inner surface, smooth behind. *Inflorescence simple panicled;* the first four or five uppermost spikelets arising immediately from the rachis; the lowermost from the lateral branches. *Panicle* leaning slightly to one side; rachis roughish, with branches arising alternately on each side. *Spikelets* of an ovate-lanceolate form, of five or six florets. *Calyx* of two acute unequal smooth glumes (Fig. 1), three-ribbed, the lateral ribs of the smaller glume rather indistinct. *Florets* of two palea (Fig. 2), the outer palea of lowermost floret rather longer than the calyx; five-ribbed; membranous and often bifid at the summit; sometimes furnished with a *very short* rough awn, arising immediately *behind* the *membranous extremity*. *Inner palea* about equal in length to the outer palea, membranous, acute, often bifid, with two green marginal ribs minutely fringed.

Obs.—This and the two following species I have deemed advisable to place in a new genus, since they differ widely in their characters from the genus in which they were formerly placed (*Festuca.*) They are now, however, distinguished from the genus *Festuca*, in the radical leaves being broader than those of the stem; *awn* (when present) arising from behind the summit of the outer palea;—whereas in *Festuca* the radical leaves are generally narrower than those of the stem, and the awn always arises from the *extreme summit* of the outer palea, (See Fig. 2.)

Bucetum pratense is very probably only a variety of *Bucetum elatior*, as the only difference between them is, that the panicle of the former is *simple* while that of the latter is *compouud*. *Bucetum loliacea* appears also gradually to pass into *Bucetum pratense.*

The cultivation of this grass deserves the attention of farmers, as it will thrive well on most soils, and is much liked by all descriptions of cattle. Mr Sinclair states that "the meadow fescue constitutes a very considerable portion of the herbage of all rich natural pastures and irrigated meadows; it makes excellent hay, and though a large plant, the leaves of the herbage are succulent and tender, and apparently much liked by cattle, as they never form rank tufts, which is the case with the larger grasses. It does not appear to arrive at its full productive powers from seed so soon as either the cock's-foot or fox-tail grass; and, though essential for permanent pasture, is not by

itself very well adapted for alternate husbandry, but should be combined with cock's-foot, rye-grass, and rough-stalked meadow-grass. It is of greater value at the time of flowering than at the time the seeds are ripe, as three to one. In the deep alluvial soils in Lincolnshire, this grass is not so prevalent as in the clay districts. In the vale of Aylesbury it constitutes a considerable portion of the most valuable and fattening pastures of that rich grazing district."

It is a frequent grass in Scotland, England, and Ireland; also a native of Lapland, Norway, Sweden, Germany, France, Switzerland, Italy, Russia, and the United States. Its limit of altitude is about 500 feet above the sea.

Flowers in the last week of June, and ripens its seed about the beginning of August.

71. Bucetum elatius *

Tall Fescue-Grass.

Specific Characters.—Awn short. Panicle compound. (Plate XLVI.)

Description.—It grows from three to five feet high. The root is perennial, fibrous, somewhat creeping, forming large tufts. *Stem* round, erect, smooth and striated; bearing five or six leaves with striated and mostly smooth sheaths; the upper sheath longer than its leaf, crowned with a short ligule embracing the stem more on one side than on the other. *Joints* five, smooth, darkish; the first and second rather remote. *Leaves* flattish, linear, acute; the upper leaf smaller than those below; scabrous towards the point; rough on the inner surface, smooth on the lower half of the back. *Inflorescence compound panicled;* the first four or five spikelets arising immediately from the rachis on short footstalks; the lower ones on simple and compound branches. *Panicle* large, spreading, inclining to one side; the rachis and branches rough. *Spikelets* of an ovate-lanceolate form, of five or six *slightly awned* florets. *Calyx* of two unequal acute glumes (Fig. 1), the inner one the larger, three-ribbed, roughish on the upper part of the central rib; the outer glume without lateral

* *Bucetum elatius* Parnell. *Festuca elatior*, Linn. Smith, Hooker, Greville. *Schedonorus elatior*, Lindley.

ribs. *Florets* of two paleæ (Fig. 2), the outer palea of lowermost floret longer than the glumes, roughish to the touch; membranous at the summit and often bifid; five-ribbed, the dorsal rib terminating in a *short rough awn passing behind the membranous summit. Inner palea* membranous, equal in length to the outer palea, acute, with two green marginal ribs minutely fringed.

—— —— *variegatum*, a variety with large spikelets variegated with purple and white. The branches of the panicle short. The leaves rather broad and hairy on the inner surface. (Plate XLVII.) Frequent along the sea shore and on banks of rivers.

Obs.—*Bucetum elatior* is distinguished from *Bucetum giganteum* in the *awn* of the outer palea being very short, not one-sixth the length of the palea;—whereas in *B. giganteum* the *awn* of the outer palea is very long, more than the length of the palea. (Plate XLVII.)

From *Bucetum pratense*, in the panicle being compound instead of simple.

This is a nutritive and very productive grass, grows naturally in rich moist soils of a tenacious clayey nature by the banks of rivers, in moist shady woods, and near the sea coast. Notwithstanding its coarse appearance cattle appear fond of it, especially cows. It would form a valuable grass for those damp soils that cannot be made sufficiently dry for the growth of more valuable grasses. *Festuca elatior* is a frequent grass in Scotland, England, and Ireland, also a native of Lapland, Norway, Sweden, Germany, France, Switzerland, Italy, and North America. Its limit of altitude is about 500 feet above the sea.

Flowers in the first week of July, and ripens its seed about the middle of August.

72. Bucetum giganteum.*

Tall Bearded Fescue-Grass.

Specific Character.—Awn longer than the palea. (XLVII.)

Description.—It grows from three to four feet high. The root is

* *Bromus giganteus*, Linn. Hooker. *Festucas gigantea*, Smith, Lindley, Koch. *Bucetum giganteum*, Parnell.

perennial, fibrous, somewhat creeping. *Stem* erect, round, smooth and striated, bearing five or six broad leaves, with striated and mostly smooth sheaths; the upper sheath longer than its leaf, crowned with a short, reddish brown decurrent ligule, embracing the stem more on one side than on the other. *Joints* five, smooth, darkish; the first and second rather remote. *Leaves* lanceolate, flat, acute; the upper one smaller than those below; scabrous towards the points; rough on both surfaces except at the base of the outer surface. *Inflorescence* simple or compound panicled; the first three or four spikelets arising immediately from the rachis on short footstalks; the lower ones on lateral branches. *Panicle* large, loose, inclining to one side, with the lower branches arising in pairs from the rough rachis. *Spikelets* ovate-lanceolate, usually of five awned florets. *Calyx* of two unequal acute glumes (Fig. 1); *three-ribbed*, smooth and membranous at the margins. *Florets* of two paleæ (Fig. 2), the outer palea of lowermost floret longer than the calyx, roughish to the touch, membranous at the summit and often bifid; *five-ribbed*, the dorsal rib scabrous towards the upper part, and terminating in a long rough awn longer than the palea, *passing behind the membranous summit. Inner palea* equal in length to the outer palea, furnished with two green marginal ribs minutely fringed.

Obs.—Bucetum giganteum is distinguished from the genus *Bromus* in the *ligule* being very short; *styles* arising from the summit of the ovarium;—whereas in *Bromus* the *ligule* is prominent and the *styles* arise from the side of the ovarium, (Fig. 6.)

From *Bucetum elatior*, in the awn being longer than the palea;—whereas in *B. elatior* it is not one-sixth the length of the palea.

Bucetum giganteum is found in woods and damp shady places. It is said to grow equally well when cultivated in open situations. Horses and cows eat it, but give a preference to many other grasses. The seeds are much sought after by small birds. The leaves, although produced in great abundance, afford but little nourishment to cattle.

It is a frequent grass in Scotland, England, and Ireland; also a native of Norway, Sweden, Denmark, Germany, France, Switzer-

land, and Russia. Not found in America. Its limit of altitude is about 500 feet above the sea.

Flowers in the third week of July, and ripens its seed about the end of August.

73. Bromus mollis. *

Soft Brome-Grass.

Specific Characters.—Large glume seven-ribbed. Glumes and florets hairy, not toothed on the central rib. (Plate XLVIII.)

Description.—It grows from twelve to eighteen inches high. The root is annual, fibrous. *Stem* erect, round, and more or less pubescent, with the hairs pointing mostly downwards; bearing three or four leaves with striated sheaths; upper sheath crowned with a small obtuse jagged ligule; the lower sheaths soft and hairy, with the hairs pointing downwards. *Joints* four or five, slightly pubescent. *Leaves* flat, linear lanceolate, striated, pubescent on both surfaces, rough at the edges and points. *Inflorescence* racemed or simple panicled. *Raceme* erect, its branches rough and hairy, the lower ones arising from the rachis mostly in threes. *Spikelets* erect, ovate, of a darkish green, soft to the touch, usually of ten awned florets; *the summit of the large glume being midway between its base and the apex of the third floret* (Fig. 3). *Calyx* of two broad *hairy* nearly equal glumes (Fig. 1), membranous at the margins; upper glume seven-ribbed; *dorsal rib not toothed;* lower glumes mostly five-ribbed. *Florets* of two paleæ (Fig. 2), the outer palea of lowermost floret rather longer than the glumes, *hairy*, soft to the touch, seven-ribbed; the dorsal rib not toothed, terminating in a rough awn, which is not quite the length of the palea; membranous at the margins, and mostly bifid at the summit. *Inner palea* linear-oblong, rather shorter than the outer palea, furnished with two green marginal ribs, fringed with white hairs. *Awn* slightly wavy, arising from a little below the bifid membranous summit of the outer palea. *Scales* of the nectary entire. *Ova-*

* *Bromus mollis*, Linn., Koch, Smith, Hooker, Lindley, Greville. (See Babington's Primitiæ Floræ Sarnicæ, p. 133; a valuable work, containing many useful and instructive remarks.)

rium obtuse, hairy on the upper half. *Styles* distinct, arising from the side of the ovarium. *Stigmas* feathery.

Obs.— *Bromus mollis* is distinguished from *Bromus racemosus* in the glumes and florets being hairy, with their central ribs not toothed, —whereas in *B. racemosus* the glumes and florets are not hairy, but slightly roughish, and their central ribs are distinctly toothed on the upper half.

From *Bromus secalinus* and *Bromus arvensis*, in the *spikelets* being hairy, and the summit of the large glume being half-way between its base and the summit of the *third* floret;—whereas in *B. secalinus* and *B. arvensis*, the *spikelets* are not hairy, and the summit of the large glume is half-way between its base and the summit of the *second* floret of the same side. (Fig. 3.)

This grass seems to prevail on poor or exhausted grass lands, and is often an unwelcome intruder in corn-fields and mowing grounds. Its being an annual, producing a scanty supply of herbage, which is not relished by cattle, are disadvantages which are not compensated by its early growth. Small birds are fond of the seeds, which are rather large, and ripen early. It is a frequent grass in Scotland, England, and Ireland; also a native of Norway, Sweden, Denmark, Germany, France, Switzerland, Italy, North Africa, and North America. Its limit of altitude is about 1000 feet above the sea.

Flowers in the last week of May, and ripens its seed in the middle of June.

74. Bromus racemosus. *

Smooth Brome-Grass.

Specific Characters.—Large glume seven-ribbed. Panicle erect. Upper part of the central ribs of the glumes toothed. (Plate XLVIII.)

Description.—It grows from fifteen inches to two feet high. The root is annual, fibrous. *Stem* erect, round, *slightly pubescent*, (the hairs pointing mostly upwards), bearing four or five leaves with striated

* *Bromus racemosus*, Koch, Smith, Hooker, Lindley, Greville.

sheaths; the upper sheath crowned with an obtuse ragged ligule; the lowermost sheaths soft and hairy, (the hairs pointing downwards). *Joints* five, slightly pubescent. *Leaves* flat, linear lanceolate, pubescent, soft to the touch, scabrous at the points. *Inflorescence* racemed or simple panicled. *Raceme erect*, its branches rough, the lower ones arising from the rachis mostly in threes. *Spikelets* erect, ovate, somewhat polished, of a light green, usually of eight awned florets; *the summit of the large glume being midway between its base and the apex of the third floret*, (Fig. 3). *Calyx* of two broad nearly equal glumes, (Fig. 1), rough to the touch, membranous at the margins, toothed on the upper half of the keel; inner glume seven-ribbed; outer glume, which is the smaller, three-ribbed. *Florets* of two paleæ (Fig 2); outer palea of lowermost floret rather longer than the glumes, glossy, roughish to the touch, (not hairy), seven-ribbed; the dorsal rib minutely toothed on the upper part, and terminating in a rough awn, which is not quite the length of the palea; membranous at the margins, and mostly bifid at the summit. *Inner palea* linear oblong, very little shorter than the outer palea, furnished with two green ribs fringed with white hairs. *Awn* slightly wavy, arising from a little below the bifid membranous apex of the outer palea.

Obs.—Bromus racemosus is distinguished from *Bromus mollis*, in the calyx and florets being rough to the touch, (not hairy), and the upper third of the central ribs of both glumes and outer palea minutely toothed;—whereas in *B. mollis* the calyx and florets are soft, covered with a number of slender hairs, and the central ribs of the glumes and outer palea hairy but not toothed.

From *Bromus secalinus* and *Bromus arvensis*, in the summit of the large glume being half-way between its base and summit of the third floret on the same side;—whereas in *B. secalinus* and *B. arvensis*, the summit of the large glume is half-way between its base and summit of the second floret, (Fig. 3).

Bromus racemosus, although of early growth, will not compensate the farmer for its cultivation, as the quantity of leaves it produces are very few, and they soon wither, affording but little nourishment to cattle. It grows best in poor gravelly soil, and is scarcely ever found in rich pastures. It is a frequent grass in Scotland, England, and Ire-

land; also a native of Norway, Sweden, Denmark, Germany, France, Switzerland, Italy, North Africa, and North America. Its limit of altitude seems to be about 1000 feet above the sea.

Flowers in the first week of June, and ripens its seed about the end of the same month.

75. Bromus secalinus.*

Smooth Rye Brome-Grass.

Specific Characters.—Large glume seven-ribbed. Panicle slightly drooping. Spikelets ovate, showing the rachis when in seed. (Plate XLIX.)

Description. — It grows from eighteen inches to two feet high. The root is annual, fibrous. *Stem* erect, smooth, round, and striated, bearing four or five leaves with striated sheaths; the upper sheath crowned with an obtuse ragged membranous ligule; the lower sheaths soft and hairy, the hairs pointing downwards. *Joints* five, slightly hairy. *Leaves* flat, soft, linear, sharp-pointed, more downy on the upper than on the under surface; the points and margin rough to the touch; furnished with a few long scattered hairs mostly on the margins towards the base. *Inflorescence* racemed or simple panicled. *Panicle* mostly erect; when in seed slightly drooping; its branches rough, the lower ones arising from the rachis mostly in threes. *Spikelets* ovate, polished, of a yellowish-green tinge, *showing the rachis when advanced in seed;* usually of seven awned florets; *the summit of the large glume being midway between its base and the summit of the second floret,* (Fig. 3). *Calyx* of two broad nearly equal acute glumes (Fig. 1), roughish to the touch, membranous at the margins, toothed on the upper half of the keel; inner glume seven-ribbed; outer glume, which is the smaller, three-ribbed. *Florets* of two paleæ (Fig. 2), the outer palea of lowermost floret oval, rather longer than the glumes, glossy, roughish to the touch, (not hairy), seven-ribbed, the dorsal rib minutely toothed on the upper part, and terminating in a rough awn, which is about the length of the palea; membranous at the margins and mostly bifid at the summit. *Inner palea* linear-oblong, very little shorter than the outer palea, furnished with two green marginal ribs fringed with white hairs. *Awn* slightly wavy,

* *Bromus secalinus*, Smith, Hooker, Koch, Lindley.

arising from a little below the bifid membranous apex of the outer palea.

—— —— *velutinus* (Plate 1884, Eng. Bot.) A variety with large ovate-oblong spikelets of ten to fifteen florets. Occasionally met with. *Bromus velutinus,* Hooker, Smith. *Bromus multiflorus,* Eng. Bot.

Obs.—*Bromus secalinus* is readily distinguished from *Bromus racemosus* and *Bromus mollis,* in the *apex* of the large glume being mid-way between its *base* and the *summit* of the *second* floret of the same side; —whereas in *B. racemosus* and *B. mollis* it is midway between its *base* and the *summit* of the *third* floret. (See Fig. 3). This character I find constant, and can therefore be depended on at any stage of growth.

From *Bromus arvensis,* in the spikelets having fewer florets; *outer palea* rounded at the summit, and much broader compared to its length; twice its width more than equals its length by one-third;—whereas in *B. arvensis* the outer palea is more of a conical form, and twice its width exactly equals its length, (Fig. 4).

Bromus secalinus is a troublesome weed to the farmer, especially when it takes possession in wheat and rye-fields. It is readily distinguished when growing in these situations, as it overtops the surrounding grass, and the panicle droops as the seeds advance to maturity. It is an early grass, but the quantity of herbage is too limited to admit of its being cultivated with advantage. The seeds, it is said, are often the cause of bitter flour.

It is a frequent grass in the cultivated districts of Scotland, England, and Ireland; also a native of Norway, Sweden, Germany, France, Italy, and West Asia. Not met with in the United States. Its limit of altitude seems to be about 500 feet above the sea.

Flowers in the first week of June, and ripens its seed about the end of the same month.

76. Bromus arvensis.*

Taper Field Brome-Grass.

Specific Characters.—Large glume seven-ribbed. Panicle drooping. Spikelets linear-lanceolate. (Plate XLIX.)

* *Bromus arvensis,* Koch, Smith, Hooker, Lindley.

Description.—It grows from eighteen inches to three feet high. The root is annual, fibrous. *Stem* erect, round, smooth, and finely striated; bearing four or five leaves with striated sheaths; the upper sheath crowned with an obtuse ragged ligule; the lower sheaths soft and hairy, the hairs pointing downwards. *Joints* five, slightly pubescent. *Leaves* flat, soft, sharp-pointed, more downy on the upper than on the under surface, the points and margins rough to the touch. *Inflorescence* simple panicled, occasionally racemed. *Panicle* at first erect, at length drooping, its branches and upper part of the rachis rough; the lower branches arising from the rachis mostly in threes. *Spikelets* linear-lanceolate, at length more ovate; glossy, frequently tinged with brownish-purple; usually of ten awned florets, the apex of the large glume being midway between its base and the summit of the second floret of the same side. *Calyx* of two nearly equal broad acute glumes (Fig. 1), membranous at the margins, roughish to the touch, toothed on the upper half of the keels; inner glume seven-ribbed; outer glume, which is the smallest, three-ribbed. *Florets* of two paleæ (Fig. 2), the outer palea of lowermost floret oval, rather longer than the glumes, glossy, roughish to the touch, seven-ribbed, the dorsal rib minutely toothed on the upper part, and terminating in a rough awn; membranous at the margins, and bifid at the summit. *Inner palea* linear-oblong; very little shorter than the outer palea, furnished with two green marginal ribs, fringed with white hairs. *Awn* slightly wavy, arising from a little below the bifid membranous apex of the outer palea, and equal in length to the small glume. *Scales* of the nectary entire. *Ovarium* obtuse, hairy on the upper part. *Styles* distinct, arising from the side of the ovarium. *Stigmas* feathery.

Obs.—*Bromus arvensis* is distinguished from *Bromus secalinus*, in the spikelets being longer and more linear. *Outer palea* not so obtuse; twice the width of the palea exactly equals its length, (Fig. 4);—whereas in *B. secalinus* the outer palea is very obtuse and broad; twice the width of the palea more than equals the length by one-third, (Fig. 4.)

From *Bromus racemosus* and *Bromus mollis*, in the apex of the large glume being half-way between its base and the summit of the *second*

floret;—whereas in *B. racemosus* and *B. mollis* it is half-way between its base and the summit of the *third* floret, (Fig. 3.)

Bromus arvensis frequents richer soils than the three already described species, although they are frequently all found growing near the same spot. It is also of more value, affording a considerable weight of nutritive hay, especially if cut at the time of flowering; but if left unmown till the seed is ripe, the crop becomes comparatively of no value. The principal merit of this grass is its herbage in spring, affording an early bite to sheep and lambs. It is a frequent grass in the neighbourhood of Edinburgh as well as in England and Ireland; also a native of Lapland, Norway, Sweden, Germany, France, Italy, and West Asia. Not known in America. Its limit of altitude is about 500 feet above the sea. Flowers in the second week of June, and ripens its seed in the first week of July.

77. Bromus sterilis.*

Barren Brome-Grass.

Specific Characters.—Large glume three-ribbed. Awn longer than the palea. Outer palea seven-ribbed. Panicle drooping. (Plate L.)

Description.—It grows from one to two feet high. The root *annual*, creeping. *Stem* round, roughish, and striated, bearing four or five leaves, with striated, roughish, slightly pubescent sheaths; the upper sheath about equal in length to its leaf; crowned with an obtuse ragged ligule. *Joints* five, naked. *Leaves* flat, linear, acute, roughish, *pubescent*, and furnished with a few straggling white hairs, especially on the upper surface. *Inflorescence* panicled, of a light-green, frequently tinged with purple. *Panicle* spreading, drooping, its branches long, slender, rough, slightly divided, the lower ones mostly in pairs, arising from the rough acutely angular rachis. *Spikelets* long and lanceolate, usually of eight awned florets. *Calyx* of two unequal acute glumes (Fig. 1), the upper one with three rough ribs, minutely toothed on the upper half; the lower glume without lateral ribs, sharply toothed on the upper half of the keel. *Florets* of two paleæ (Fig. 2); the outer palea of lowermost floret

* *Bromus sterilis*, Linn. Hooker, Smith, Greville, Lindley, Koch.

longer than the calyx; membranous at the margins, bifid at the summit; *seven-ribbed*, the dorsal rib terminating in a long rough awn, *longer* than the palea, *passing behind the bifid summit*. *Inner palea* linear, lanceolate, about *one-third shorter* than the outer palea, with two green marginal ribs, delicately fringed.

Obs.—Some varieties of this grass, especially those found in dry exposed situations, and somewhat stunted in their growth, very much resemble *Bromus diandrus* in their general appearance, and which can be only satisfactorily determined by the examination of the ribs of the outer palea. In *Bromus sterilis* the *outer palea* has seven distinct ribs placed at equal distances;—whereas in *Bromus diandrus* the *outer palea* has also seven ribs, but the rib on each side of the dorsal rib is indistinctly seen, and the two marginal ribs on each side are prominent and placed close together. (See Fig. 4.)

Bromus sterilis is distinguished from *Bromus asper*, in the *outer palea* not being hairy, and the *awn* being longer than the palea;—whereas in *B. asper* the *outer palea* is hairy, and the *awn* is never the length of the palea. (Plate LI.)

This grass grows in shady places, on rather dry sandy soil, especially under hedges and road-sides. It is applied to no agricultural use, as cattle seldom or ever eat it, owing probably to the long rough awns with which the spikelets are furnished. It is a common grass throughout Scotland, England, and Ireland; also a native of Lapland, Norway, Sweden, Germany, France, Italy, and North Africa. Not found in America. Its limit of altitude seems to be about 600 feet above the sea.

Flowers in the third week of June, and ripens its seed in the last week of July.

78. Bromus diandrus. *

Upright Annual Brome-Grass.

Specific Characters.—Large glume three-ribbed. Awn equal in length to the palea. Panicle erect. (Plate L.)

Description.—It grows from six to twelve inches high. The root is *annual*, fibrous. *Stem* erect, *smooth*, round and polished; bearing

* *Bromus diandrus*, Curtis, Smith, Hooker. *Bromus madritensis*, Linn. Koch.

three to four leaves, with striated sheaths; the upper sheath somewhat downy, crowned with a short, obtuse, ragged ligule; the lower sheaths hairy, with the hairs pointing downwards. *Joints* four, smooth. *Leaves* flat, linear, acute, more or less hairy on both surfaces, scabrous at the points and margins. *Inflorescence* racemed. *Raceme* erect, close. *Spikelets* arising immediately from the rachis on footstalks not as long as the spikelets; the lower ones mostly in pairs or threes; the rachis and footstalks nearly smooth; the spikelets generally of a brownish purple, usually of eight awned florets. *Calyx* of two, unequal acute glumes (Fig. 1); the upper glume the longest, three-ribbed, the dorsal rib minutely toothed on the upper half; the lower glume without lateral ribs. *Florets* of two paleæ (Fig. 2); the outer palea of lowermost floret longer than the calyx, bifid and membranous at the summit; the margins occasionally furnished with delicate white hairs; seven-ribbed, the *two marginal ribs on each side placed close together*, the rib on each side of the central rib very indistinct (Fig. 4), the central rib minutely toothed nearly its whole length, and terminating in a long straight rough awn, about the length of the palea, and passing behind the bifid summit. *Inner palea* linear-lanceolate, membranous, a very little shorter than the outer palea, furnished with two green marginal ribs delicately ciliated.

Obs.—*Bromus diandrus* is distinguished from *Bromus sterilis*, in the *panicle* being erect and close, with its branches nearly smooth, not as long as the spikelets; *stem* smooth; *outer palea* with the two marginal ribs on each side close together, the intermediate rib very indistinctly seen; *awn* about the length of the palea;—whereas in *B. sterilis* the *panicle* is loose and drooping, its branches rough and longer than the spikelets; *stem* roughish; *outer palea* with seven distinct ribs placed at equal distances; *awn* longer than the palea.

From *Bromus erectus*, in the *outer palea* being twice the length of the small glume of the calyx; *awn* about equal in length to the palea, and the *hairs* of the sheaths pointing downwards;—whereas in *B. erectus* the *outer palea* is not more than one-third longer than the small glume of the calyx; *awn* not more than half the length of the palea, and the *hairs* of the sheaths point upwards.

Bromus diandrus is of as little use to the agriculturist as the preceding species, and of much rarer occurrence. It grows on dry soils,

mostly on rock and walls, and is a rare grass in Scotland, found occasionally in the neighbourhood of Edinburgh and on the Fifeshire coast. In England it occurs in the counties of Durham, Worcester, Glo'ster, Surrey, Kent, Hants, Somerset, and Devon ; also a native of Germany, Switzerland, France, and Italy. It has not been found in Ireland or America. Its limits of altitude seem to be about 500 feet above the sea.

Flowers in the third week of June, and ripens its seed about the end of July.

78. Bromus erectus.*

Upright Brome-Grass.

Specific Characters.—Large glume three-ribbed. Awn about half the length of the palea. Outer palea indistinctly seven-ribbed, and one-third longer than the small glume. (Plate LI.)

Description.—It grows from two to three feet high. The root is perennial, fibrous. *Stem* erect, round, smooth, and polished; bearing four or five leaves, with somewhat hairy sheaths, especially the lower ones, (the hairs pointing *upwards*); the upper sheath crowned with a short, obtuse, ragged ligule. *Joints* five, very slightly pubescent. *Leaves* narrow, linear, acute, harsh, scabrous towards the points, nearly erect, with long slender scattered hairs pointing upwards. *The upper leaf broader than those of the root. Inflorescence* racemed or simple panicled. *Raceme* erect, rather close, its branches and upper part of the rachis rough; the lowermost branches arising from the rachis mostly in threes. *Spikelets* erect, of eight or nine awned florets, (sometimes with only four florets,) tinged with brownish purple. *Calyx* of two nearly equal acute glumes (Fig. 1), glossy, membranous at the margins; upper glume the larger, three-ribbed, the dorsal rib toothed its whole length; lower glume without lateral ribs, and toothed at the back. *Florets* of two paleæ (Fig. 2), the outer palea of lowermost floret about one-third longer than the small glume of the calyx; bifid and membranous at the summit; seven-ribbed, four of which are rather indistinct; the dorsal rib minutely toothed its whole length, and terminating in a straight rough awn about half the length of the palea, and passing behind the bifid

* *Bromus erectus*, Koch, Smith, Hooker, Lindley.

summit of the palea. *Inner palea* about equal in length to the outer palea, membranous, acute, furnished with two green marginal ribs, delicately fringed with fine hairs. *Anthers* of a deep saffron colour. *Styles* rather distant.

—— —— *hirsutus.*—A variety with the stem glumes and outer palea hairy. Found occasionally on dry sandy soil.

Obs.—*Bromus erectus* has frequently been mistaken for *Bromus arvensis,* but is readily distinguished from it in the *large glume* of the calyx having only three ribs;—whereas in *B. arvensis* the *large glume* has seven ribs. (See Plate XLIX. Fig. 1.)

From *Bromus asper,* in the radical leaves being narrower than those of the stem; *hairs* of the sheaths pointing upwards; *outer palea* seven-ribbed, and not more than one-third longer than the small glume of the calyx; whereas in *B. asper* the radical leaves are broader than those of the stem; hairs of the sheaths point downwards; *outer palea* five-ribbed, and twice the length of the small glume of the calyx.

Bromus erectus is stated by Mr Curtis as being peculiar to chalky soils, and that it becomes more luxuriant in growth when cultivated in a garden than in its natural wild state. Mr Sinclair, however, has found it on rather low-lying sandy soils, where it appeared as luxuriant as when cultivated in the grass garden. It seems to be not much relished by cattle, and but little adapted for pasture land. Pheasants, it is said, are fond of the seeds. This grass is by no means frequent in Scotland, and seldom met with in Ireland. In England it is found in the counties of York, Anglesea, Worcester, Oxon, Cambridge, Norfolk, Surrey, Kent, Sussex, and Somerset. It is also a native of Norway, Sweden, Germany, France, and Italy. Not found in America. Its limit of altitude seems to be about 500 feet above the sea.

Flowers in the second and third week of June, and ripens its seed in the third week of July.

80. Bromus asper. *

Wood Brome-Grass.

Specific Characters. — Large glume three-ribbed. Awn rather

* *Bromus asper,* Linn. Smith, Hooker, Greville, Koch, Lindley.

more than half the length of the palea. Outer palea hairy, five-ribbed. Panicle drooping. (Plate LI.)

Description.—It grows from two to three feet high. The root is annual or biennial, fibrous. *Stem* erect, round, and *slightly roughish;* bearing four or five leaves, with striated hairy sheaths (*the hairs pointing downwards*), the lower sheaths somewhat hispid, the upper sheath crowned with an obtuse lacerated membranous ligule. *Joints* five, *small,* rather hairy. *Leaves* broad, flat, rough, sharp-pointed, with a few long straggling white hairs; the radical leaves *broadest. Inflorescence* simple panicled. *Panicle* drooping, at length pendulous, its branches and upper part of the rachis very rough; the lower branches long, and generally in pairs. *Spikelets* usually an inch in length, linear-lanceolate, of about eight awned florets, glossy, tinged occasionally with brownish-purple. *Calyx* of two unequal acute glumes (Fig. 1), the upper glume the longest, *three-ribbed,* the dorsal rib minutely toothed nearly its whole length; the lower glume without lateral ribs, and toothed on the upper half of the keel, *Florets* of two paleæ (Fig. 2), the outer palea of lowermost floret longer than the calyx, and *about twice the length of the small glume;* bifid and membranous at the summit; five-ribbed, the dorsal rib minutely toothed, and terminating in a long straight rough awn, about half the length of the palea, and passing behind the membranous bifid summit. The lower part of the palea hairy, especially the marginal ribs. *Inner palea* rather shorter than the outer palea, with two green marginal ribs delicately fringed.

Obs.—*Bromus asper* is distinguished from *Bromus erectus,* in the *upper leaf* being narrower than the radical leaves; *hairs* on the sheaths pointing downwards; *outer palea* five-ribbed, and twice the length of the small glume of the calyx;—whereas in *Bromus erectus* the *upper leaf* is broader than the radical leaves; *hairs* on the sheaths pointing upwards; *outer palea* seven-ribbed, and not more than one-third longer than the small glume of the calyx.

From *Bromus sterilis,* in the outer palea being hairy and the awn not the length of the palea;—whereas in *B. sterilis* the outer palea is never hairy, and the awn is always longer than the palea.

This grass grows naturally in damp shady woods, and is never

found in open situations. It is a tall coarse grass, not recommended for agricultural purposes. Horses and cows eat it in common with other grasses of the wood, but they give a preference to pasture grass, except in cases of necessity when quantity is of greater consideration than quality. It is a common grass in Scotland, England, and Ireland; also a native of Norway, Sweden, Germany, Switzerland, France, Italy, and Russia. Not found in America. Its limit of altitude is about 500 feet above the sea.

Flowers in the third week of July, and ripens its seed about the end of August.

81. Trisetum pratense.*

Narrow-Leaved Oat-Grass.

Specific Character.—Leaves and sheaths not hairy. (Plate LII.)

Description.—It grows from eighteen inches to two feet high. The root is perennial, fibrous. *Stem* erect, nearly round, smooth, and finely striated, bearing from three to four leaves with striated sheaths; the upper sheath very long, more than thrice the length of its leaf, slightly roughish to the touch, crowned with a long narrow sharp membranous ligule; lower sheaths much shorter than their leaves, and generally smooth. *Joints* three, smooth, situated near the base. *Leaves*, in exposed situations narrow, linear, acute, generally folded, harsh, smooth on the back, and rough on the inner surface. On each side of the central rib are two light-green lines, very perceptibly seen when the leaf is held against the light. *Inflorescence* compound racemed or simple panicled; the first three or four spikelets arising immediately from the rachis on short footstalks, the lower spikelets mostly in pairs on long peduncles. *Panicle* long, erect, close, the rachis and branches rough. *Spikelets* large, of an oval form, of four or five awned florets scarcely protruding beyond the calyx. *Calyx* of two unequal acute glumes (Fig. 1), roughish at the keel, three-ribbed, purplish on the lower half. *Floret* of two paleæ, (Fig. 2), the outer palea of lowermost floret acute, often bifid; membranous on the upper part; roughish on the keel; five-ribbed; hairy at the base. *Inner palea* about one-fourth shorter than the outer palea, flat,

* *Avena pratense*, Koch, Smith, Hooker.

very thin, and delicately fringed at the margins. *Awn* arising from a little *above* the centre of the outer palea, sometimes from the centre, (liable to vary even in the same plants), rough; twisted at the base; longer than the palea; becoming bent when dry.

—— —— *longifolium*, a variety with long linear *flat* leaves, the upper leaf very rough on both surfaces and margins, but rather more so on the inner surface; the second leaf rather broader and more than three times the length of the upper leaf, very rough on the inner surface, but nearly smooth behind; most of the radical leaves as long as the culm, narrower than those of the stem, perfectly smooth behind, and very rough within; all the leaves have a glaucous appearance, especially on the inner surface. The stem roughish from above downwards; *sheaths* flattish, slightly carinated, strongly ribbed; roughish to the touch from below upwards; *root* with several long downy fibres; in other respects similar to *Trisetum pratense.* (Plate LII.) This variety is found in moist shady woods near the sea in the neighbourhood of Edinburgh.

—— —— *latifolium*, a tall, stout variety, growing to the height of two feet or more; the leaves short and broad, coming suddenly to a point; the upper leaf flat, rough on the inner surface and edges, nearly smooth behind, with a long, compressed, carinated sheath, rough from below upwards; the lower leaves folded, rough on the inner surface, and perfectly smooth behind; *stem* smooth; *root* fibrous (Plate LIII.) In other respects it agrees with *Trisetum pratense.* This description and accompanying figure were taken from an authentic specimen gathered in the Isle of Arran, and which is now growing in the Edinburgh Botanic Garden. It seems to be the *Avena planiculmis* of Hooker, and answers to Smith's description of *Avena alpina;* but as to whether it be known to continental authors under those names appears doubtful. I cannot, however, discover any character sufficiently prominent to consider it as any thing more than a variety of *Trisetum pratense.* The length and width of the leaves are liable to vary according to the soil and situation, and the carinated sheaths cannot be depended on as a character, as we frequently meet with it both in the broad and narrow-leaved varieties.

Obs.—*Trisetum pratense* differs from *Trisetum pubescens* in the spikelets being larger; *large glume* of the calyx more lanceolate; *ra-*

dical leaves harsh, rough, not hairy;—whereas in *T. pubescens* the radical leaves are soft, flaccid, and hairy. (See Plate LIII.)

From *Trisetum flavescens*, in the spikelets being much larger and fewer; *ligule* long and pointed;—whereas in *T. flavescens* the spikelets are small and numerous; *ligule* very short.

Trisetum pratense does not appear to be confined to any particular place or soil, as it is found growing on rocks, dry heaths, as well as in moist meadows, but it gives a preference to chalky soils. Its produce and nutritive properties are not sufficiently great to be recommended to the notice of farmers. It bears a greater value during the time of flowering than when the seeds are ripe as nine to four. Sheep and cows are fond of the early leaves, but when allowed to grow too coarse, cattle seldom eat it. This grass is frequent in Scotland, England, and Ireland; also a native of Lapland, Norway, Sweden, Germany, France, Spain, Portugal, and Italy. Not found in America. Its limit of altitude is 2500 feet above the sea.

Flowers in the first week of June, and ripens its seed in the middle of July.

82. Trisetum pubescens.*

Downy Oat-Grass.

Specific Characters.—Radical leaves and sheaths hairy. Ligule acute and prominent. (Plate LIII.)

Description.—It grows from one to two feet high. The root is perennial, somewhat creeping. *Stem* erect, round, smooth, and finely striated; bearing usually five leaves; upper sheath long, more than thrice the length of the leaf, smooth, crowned with a prominent, acute, membranous ligule; lower sheaths generally shorter than their leaves, covered with long soft hairs. *Joints* three or four, the two lowermost situated at the base. *Leaves* flat, broadish, flaccid, soft, hairy on both surfaces, especially those from the root. *Inflorescence* compound racemed, or simple panicled; the three or four uppermost spikelets arising immediately from the rachis on short footstalks; the lower spikelets from lateral branches or on long peduncles. *Panicle* erect, rachis nearly smooth, the branches rough. *Spikelets* not so large as

* *Trisetum pubescens.* Lindley. *Avena pubescens*, Koch, Smith, Hooker, Greville.

those of *Trisetum pratense*, of an oval form, scarcely protruding beyond the calyx, usually of three awned florets. *Calyx* of two unequal membranous acute glumes (Fig. 1), the upper one the largest; three-ribbed; the lower one without lateral ribs, and about one-third shorter. *Florets* of two paleæ (Fig. 2); the outer palea of lowermost floret membranous on the upper half; five-ribbed, roughish on the keel, tinged with reddish purple; hairy at the base, and frequently jagged at the summit. *Inner palea* very thin, flat, much shorter than the outer palea, and very minutely fringed at the margins. *Awn* longer than the large glume of the calyx; arising from a little above the centre of the outer palea; rough, of a purplish tinge, twisted at the base, and when dry becomes bent.

Obs.—*Trisetum pubescens* is distinguished from *Trisetum pratense* in the *spikelets* being smaller; *large glume* of the calyx broader; *radical leaves* soft and hairy;—whereas in *T. pratense* the *spikelets* are larger; *large glume* of the calyx lanceolate; *radical leaves* harsh, rough on the inner surface, but without hairs. (See Plate LII.)

From *Trisetum flavescens*, in the spikelets being twice the size and fewer; *ligule* long and acute;—whereas in *T. flavescens* the *ligule* is very short and obtuse. (Plate LIV.)

It is stated by Mr Sinclair, that the downy hairs which cover the surface of the leaves of this grass when growing on poor, dry, or chalky soils, almost disappear when cultivated on richer soils. It has properties which recommend it to the notice of agriculturists, being hardy, and a small impoverisher to the soil; the reproductive power is also considerable, though the foliage does not attain to a great length. Horses, cows, and sheep, eat this grass when mixed with others. It is frequent in Scotland, England, and Ireland; also a native of Norway, Sweden, Germany, France, Italy, and Russia. Not found in America. Its limit of altitude is 1000 feet above the sea.

Flowers in the second week of June, and ripens its seed in the middle of July.

83. Trisetum flavescens. *

Yellow Oat-Grass.

Specific Characters.—Radical leaves and sheaths hairy. Ligule very short and obtuse. (Plate LIV.)

Description.—It grows from one to two feet high. The root is perennial, somewhat creeping. *Stem* erect, round, smooth and polished, bearing six or seven leaves with striated sheaths; the upper sheath about twice the length of its leaf, crowned with a short obtuse ligule; lower sheaths covered more or less with long, soft, deflexed hairs. *Joints* four or five, smooth, often furnished with a circle of deflexed hairs underneath. *Leaves* flat, acute, more or less rough on both surfaces, hairy on the inner surface. *Inflorescence* panicled. *Panicle* erect, spreading, rachis and branches very slightly scabrous, the lower branches arising from the rachis mostly in fives. *Spikelets* small, erect, numerous, usually of three awned florets, projecting beyond the calyx. *Calyx* of two unequal membranous acute glumes (Fig. 1); roughish on the keels; the lower glume the smaller, about one-third shorter than the upper glume without lateral ribs; the upper glume three-ribbed, and of a light green on the back. *Florets* of two paleæ (Fig. 2); the outer palea of lowermost floret membranous, tinged with light green, bifid at the summit, five-ribbed, hairy at the base. *Inner palea* membranous, linear, acute, shorter than the outer palea, and very minutely fringed. *Awn* longer than the palea, slender, rough, twisted at the base, becoming bent when dry; arising from the back of the outer palea a little above the centre.

Obs.—*Trisetum flavescens* is distinguished from *Trisetum pubescens*, in the *spikelets* being much smaller and more numerous, and the *ligule* very short and obtuse;—whereas in *T. pubescens* the *spikelets* are more than twice the size and the *ligule* is long and acute. (Plate LIII.)

This grass grows naturally in almost every kind of soil, from the limestone rock to the irrigated meadow, and is always present in the richest natural pastures. It thrives best in a dry calcareous soil, and

* *Trisetum flavescens*, Lindley. *Avena flavescens*, Koch, Smith, Hooker, Greville.

is one of those grasses which never thrives unless combined with others. Sheep prefer it to most grasses. It is frequent in Scotland, England, and Ireland; also a native of Norway, Sweden, Germany, France, Spain, Portugal, Italy, Russia, and North Africa. Not found in America. Its limit of altitude is about 1000 feet above the sea.

Flowers in the second week of July, and ripens its seed about the middle of August.

84. Festuca bromoides. *

Barren Fescue-Grass.

Specific Character.—Awn longer than the palea. (Plate LIV.)

Description.—It grows eighteen inches high. The root is *annual*, fibrous. *Stem* erect, slender, smooth, round and naked on the upper half; bearing three or four leaves with smooth striated sheaths; the upper sheath much longer than its leaf, crowned with a very short ligule, rounded on each side, the one side more prominent than the other; second sheath not reaching to the first joint. *Joints* three, smooth, the second joint frequently throwing out a branch. *Leaves* very narrow, rather short, often involute, smooth behind, hairy on the inner surface. *Inflorescence* simple panicled, long and slender, the upper part taking a gentle curve, with the spikelets leaning to one side; the branches erect, rough, angular, and single, the lower one the longest. *Spikelets* erect, the seven or eight uppermost arising immediately from the rachis, the lower ones on branches; of five awned florets. *Calyx* of two very unequal acute glumes (Fig. 1,) the uppermost three-ribbed, the lower one without lateral ribs, (the length of the small glumes varies exceedingly even in the same panicle, therefore it cannot be relied on as a character.) *Florets* of two paleæ (Fig. 2); the outer palea of lowermost floret equal in length to the large glume, five-ribbed; roughish on the upper part, terminating in a long slender roughish awn, rather longer than the palea. *Inner palea* lanceolate, thin, occasionally bifid, furnished with two green marginal ribs, minutely fringed on the upper half.

* *Festuca bromoides*, Smith, Hooker, Greville. *Vulpia bromoides*, Dumort., Lindley. *Festuca sciuroides*, Koch.

—— —— *nana.* (Plate LV.) This is only a stunted variety, in which the stem is sheathed nearly to the summit, found growing in dry exposed situations. It seems to be the *Festuca Myurus* of Smith, Hooker, Lindley, and others, but not the *Festuca Myurus* of continental authors, which is a very different plant, being considerably more luxuriant in the panicle, the stem sheathed to the very base of the panicle; the large glume of the calyx but half the length of the lowermost floret; the outer palea rough on the upper part, with the dorsal rib and margins ciliated. (See Plate LV.) The figure is taken from Leers, *Flora Herbornensis*, (Plate III. Fig. 5;) and here inserted as a comparison, should the plant be found to occur in Scotland.

Obs.—There are few grasses that vary so much in their growth as *Festuca bromoides.* In dry situations, such as on tops of walls, it is found from two to six inches in height, of an upright rigid appearance, becoming soon dry and withered, while those in corn-fields and shady places grow to the height of two feet or more, of a tall graceful slender figure, of a pleasant green, with the panicle more or less luxuriant, taking a gentle bend to one side.

It is a frequent grass in Scotland, England, and Ireland, also a native of France, Germany, Holland, Belgium, Switzerland, and Italy. Not found in America. Its limit of altitude is about 1000 feet above the sea. Of no material agricultural use.

Flowers in the second week of June, and ripens its seed about the middle of July.

85. Festuca ovina.*

Sheeps Fescue-Grass.

Specific Characters.—Awn not half the length of the palea. Stem under the panicle, rough. Upper leaf rough on the outer surface. (Plate LVI.)

Description.—It grows from three to nine inches high. The root is perennial, *fibrous.* *Stem* erect, more or less *angular and roughish* under the panicle; bearing three or four leaves, with roughish sheaths,

* *Festuca ovina,* Linn. Koch, Hooker, Smith, Lindley, Greville.

especially the lower ones; the upper sheath much longer than its leaf, crowned with a short bi-lobed ligule, with one lobe more prominent than the other. *Joints* two or three, near the base. *Leaves* short, rigid, involute, of a rounded appearance, roughish on the outer surface; three-ribbed and hairy within; the radical leaves numerous, tufted, and much curved. *Inflorescence* simple panicled. *Panicle* short, close, erect, unilateral, leaving the rachis naked behind; branches angular and rough, very seldom in pairs, the lowermost the longest, and rather remote. *Spikelets* erect, of six florets, with very short awns; the six or seven uppermost spikelets arising immediately from the rachis on short footstalks; the lower ones from lateral branches; the summit of the lowermost floret extending beyond the large glume of the calyx. *Calyx* of two unequal acute glumes (Fig. 1,) the uppermost three-ribbed, the lower one without lateral ribs. *Florets* of two paleæ (Fig. 2), the outer palea of lowermost floret five-ribbed, rather indistinctly seen, (unless the palea be held between the lens and the light,) terminating in a short rough awn about one-sixth the length of the palea. Inner palea bifid, furnished with two green marginal ribs minutely fringed on the upper half.

The following are some of the more striking varieties:—

—— —— *hirsuta.* The same as the one described, but with the glumes and florets hairy. Frequent in rocky localities. *Festuca hirsuta* of Host.

—— —— *vivipara.* A variety with the inner palea metamorphosed into a kind of leaf, which is generally three times the length of the outer palea, (Plate LVI.) Common in alpine districts. *Festuca vivipara* of Smith.

—— —— *angustifolia.* A delicate and slender variety, with long narrow leaves, (Plate LVII.) Very common in the Highlands, where it forms a great part of the herbage. *Festuca tenuifolia* of Schrader.

—— —— *cæsia.* A striking variety, taller and stouter than those described; the spikelets larger and of a yellowish hue; outer palea mucronate and frequently hairy, (Plate LVII.) The whole plant is more or less glaucous. Not common, but occasionally met with. *Festuca cæsia* of Smith.

Obs.—Festuca ovina and its *varieties* differ from *Festuca duriuscula*

in being of smaller growth; the stem on the upper part more or less rough and angular, especially under the panicle; upper leaf involute, rough on the outer surface, and the root fibrous;—whereas in *Festuca duriuscula* the stem immediately under the panicle is round and smooth, the upper leaf mostly flat and smooth on the outer surface, and the root is more or less creeping. (See Plate LVIII.)

This grass grows naturally on rather dry sandy soils; frequently at an elevation of 4000 feet above the sea, and forms the greater part of sheep pasture grounds in the Highlands. It is the favourite food of sheep; they prefer it to all other grasses, for although small it is very nutritious. Linnæus states that sheep have no relish for hills and heaths that are destitute of this grass. The smallness of its produce renders it entirely unfit for hay. It is a common grass throughout Scotland, England, and Ireland; also a native of Lapland, Norway, Sweden, Germany, France, Switzerland, Spain, Portugal, Italy, Russia, Iceland, Siberia, Greenland, and North America.

Flowers in the second week of June, and ripens its seed about the middle of July.

86. Festuca duriuscula.*

Hard Fescue-Grass.

Specific Characters.—Awn not as long as the palea. Stem under the panicle smooth. Upper leaf smooth on the outer surface. (Plate LVIII.)

Description.—It grows from one to two feet high. The root is perennial, *somewhat creeping*, occasionally throwing out lateral shoots. *Stem* erect, round, smooth, bearing three or four leaves with smooth striated sheaths; upper sheath longer than its leaf, crowned with a very short, unequal bi-lobed ligule. Joints two or three, smooth. *Leaves* of the stem somewhat lanceolate, acute, *flat, smooth behind*, roughish and slightly downy on the inner surface, about eight or nine-ribbed, broader than the radical leaves, which are linear (very long in shady places), compressed, and somewhat fleshy. *Inflorescence*

* *Festuca duriuscula*, Linn., Smith, Hooker, Greville, Lindley,

simple panicled. *Panicle* erect, the upper part racemed, the lower with angular, rough, slightly spreading branches; very seldom in pairs, the lowermost branch the longest. *Spikelets* erect, arranged on the rachis and branches alternately; of about seven awned florets. *Calyx* of two unequal, lanceolate, acute glumes (Fig. 1), the upper glume the larger, three-ribbed, the lower one without lateral ribs. *Florets* of two paleæ (Fig. 2.), the outer palea of lowermost floret smooth, five-ribbed, terminating in a short rough awn, about one-sixth the length of the palea. *Inner palea* narrow, acute, equal in length to the outer palea, furnished with two green marginal ribs, minutely fringed on the upper part.

The following are some of the more striking varieties:—

—— —— *hirsuta.* This variety is similar to the one described, differing only in the outer palea being hairy, and the root more creeping, throwing out lateral shoots, (Plate LVIII.) Occasionally met with in shady places.

—— —— *filiformis.* A tall, slender variety, with the upper part gracefully drooping; palea acute, toothed on the upper half of the dorsal rib, and terminating in a slender awn rather more than half the length of the palea; the leaves on the stem long and linear, and the root throwing out lateral branches, (Plate LIX.) Found growing in rich soil by the sides of lanes and shady woods.

—— —— *arenaria.* A variety which seldom exceeds a foot in height; the panicle short and compact; leaves short and few, and the root oftentimes very much creeping, (Plate LIX.) The whole plant soon assumes a withered appearance. It is frequently found in sandy soil, especially along the sea coast.

—— —— *humilis.* This variety is very slender, seldom exceeding a foot in height. The panicle is narrow and compact; the stem round and smooth throughout; the leaves smooth on the outer surface; sheaths of the radical leaves hairy; the first and second joints very remote, and the root creeping, (Plate LX.) It is by no means a common variety, but is occasionally met with in alpine glens.

—— —— *rubra.* The largest of all the varieties, growing to the height of two feet or more. The spikelets seven or eight-flowered; the leaves of the stem broadish and flat; the root extensively creeping,

throwing out lateral shoots, (Plate LX.) It is found growing in sandy places along the sea-shore. *Festuca rubra* of Koch, Hooker.

As all these grasses vary exceedingly from change of soil and situation, it is difficult to determine what may be considered as species and what varieties, the structure of the spikelets being precisely the same in all, differing only in size and length of the awns, which are very uncertain characters. The creeping root has been considered by some authors to form a good mark of specific distinction; but when the plant cannot otherwise be distinguished except by reference to the root, I have considered it advisable to place it under the head of a variety.

Among the grasses which are of the most importance for agricultural purposes, the *Festuca duriuscula* ranks as one of the first. It is very productive for its size, of early growth, and thrives well in a great variety of soils and situations. It withstands the effects of severe dry weather in rich natural pastures, better than many other grasses, and retains its verdure during winter in a remarkable degree. Sheep and hares are remarkably fond of this grass. If cultivated for the purpose of hay it ought to be mown at the time of flowering, as it then contains more nutritive matter than at the time the seed is ripe. It is a common grass throughout Scotland, England, and Ireland; also a native of Lapland, Norway, Sweden, Germany, France, Switzerland, Italy, Russia, Iceland, and North America. Rare in the United States, supposed to have been introduced. Its limit of altitude is about 3000 feet above the sea.

Flowers in the second week of June, and ripens its seed in the middle of July.

87. Triticum sylvaticum. *

Slender Wheat-Grass.

Specific Characters.—Spikelets long and cylindrical. Awn more than half the length of the palea. Stem smooth. Leaves hairy on the inner surface. (Plate LXI.)

* *Brachypodium sylvaticum*, Hooker, Lindley, Koch, Beauv. *Festuca sylvatica*, Smith.

Description.—It grows from one to two feet high. The root is perennial, fibrous. *Stem* erect, round, smooth, and slender; bearing four or five leaves, with hairy striated sheaths, especially the lower ones; upper sheath shorter than its leaf, crowned with an obtuse hairy ligule. *Joints* four, hairy, the first and second very remote. *Leaves* polished, of a darkish-green, broadish, sharp-pointed, roughish on the outer, and hairy on the inner surface; finely striated, with five of the ribs very distinctly marked. *Inflorescence* racemed, approaching to a spike, the peduncles of the spikelets being very short but distinct; the upper part slightly drooping; the rachis quite smooth. *Spikelets* long and linear, usually of ten awned florets, arranged on the rachis alternately in two rows. *Calyx* of two rather unequal acute (sometimes awned) seven-ribbed glumes, (Fig. 4), more or less hairy. *Florets* of two paleæ (Fig. 2), the outer palea of lowermost floret rather longer than the calyx; more or less hairy, seven-ribbed; furnished with a long straight rough awn, seldom longer than the palea, arising from the very summit. *Inner palea* rather shorter than the outer palea, obtuse at the summit, with two green marginal ribs strongly fringed on the upper half.

Obs.—The long cylindrical spikelets will readily distinguish this species independent of any other character.

This grass is the *Brachypodium sylvaticum* of Beauvois, *Festuca sylvatica* of Smith, and *Bromus sylvaticus* of Pollich; but, as I can discover no essential generic distinction between it and *Triticum caninum*, I have therefore removed it to the *genus Triticum*.

Triticum sylvaticum is of no agricultural importance, as oxen, horses, and sheep refuse to eat it, except in cases of extreme necessity where there is no choice. Hares and rabbits have been observed to crop the extremity of the leaves during deep snows and severe frost. Its natural place of growth is in damp woods and moist shady places; it also thrives well when cultivated in open ground. It is a frequent grass in Scotland, England, and Ireland; also a native of Germany, France, Switzerland, Italy, and Russia. Not known in America. Its limit of altitude is about 1000 feet above the sea.

Flowers in the first week of July, and ripens its seed about the end of the same month.

88. Triticum cristatum.*

Crested Wheat-Grass.

Specific Characters.—Stem rough. Spike short. Leaves hairy on the inner surface. (Plate LXI.)

Description.—It grows from nine to eighteen inches high. *Stem* ascending, round, and hairy, bearing three or four leaves with smooth striated sheaths; the upper sheath longer than its leaf, crowned with a very short obtuse ligule. *Joints* four, smooth. *Leaves* linear, acute, smooth behind, hairy in front. *Inflorescence* spiked. *Spike* usually about an inch in length, with the margins of the rachis rough. *Spike lets* sessile, of an oval form, arranged alternately on each side of the rachis, of four or five florets. *Calyx* of two awned glumes of equal lengths (Fig. 1), lanceolate, six-ribbed (Fig. 4), the largest rib running very much to a side. *Florets* of two paleæ (Fig. 2), the lowermost palea of first floret longer than the glumes; five-ribbed, with a long rough awn, nearly as long as the palea, arising from the extreme summit. *Inner palea* as long as the outer, delicately fringed at the margins. *Nectary* of two oval somewhat hairy scales. *Anthers* linear forked at each side. *Filament* capillary. *Ovarium* obtuse, slightly hairy. *Styles* short, distinct. *Stigmas* feathery.

Obs.—The short spike and rough stem will readily distinguish this species.

It somewhat resembles *Hordeum maritimum*, but differs in the spikelets being arranged on the rachis solitary; *calyx* containing three or more florets;—whereas in *H. maritimum* the spikelets are in threes, and the calyx contains but one floret; independent of many other characters. (Plate X.)

This grass, which is now supposed to be extinct in Britain, was discovered many years ago by the late Mr Don, who gathered it on the east coast of Scotland between Arbroath and Montrose. It is a native of Germany, France, and Switzerland.

Flowers in the second week of July, and ripens its seed about the middle of August.

The accompanying figure and description were taken from a speci-

* *Triticum cristatum*, Smith, Hooker, Lindley. *Bromus cristatus*, Linn.

men cultivated in the Botanic Garden of Edinburgh, obtained from Mr Don himself.

89. Triticum caninum. *

Bearded Wheat-Grass.

Specific Characters.—Root fibrous. Stem smooth. Awn longer than the palea. Leaves not hairy on the inner surface. (Plate LXII.)

Description.—It grows from two to four feet high. The root is perennial, *fibrous.* *Stem* erect, round, *smooth* and slender; bearing four or five leaves with smooth striated sheaths; the upper sheath longer than its leaf, crowned with a very short obtuse ligule. *Joints* six, smooth and darkish. *Leaves* polished, of a darkish green, broad, lanceolate and acute; the upper leaf smaller than those below, roughish on *both surfaces,* but more so on the inner surface. *Inflorescence* spiked. *Spike* long and slender, about one-tenth the length of the stem, with the margins of the rachis roughish. *Spikelets* sessile, of an oval form, arranged in two rows on the zig-zag rachis; of four or five awned florets. *Calyx* of two nearly equal glumes (Fig. 1); *roughish,* awned, *three-ribbed, and somewhat hairy,* (Fig. 4.) *Florets* of two paleæ (Fig. 2), the outer palea of lowermost floret equal in length to the glume, slightly *roughish to the touch,* five-ribbed, more or less hairy, furnished with a long slender rough awn, longer than the palea, and arising from the very summit. *Inner palea* about equal in length to the outer palea, membranous, with two green marginal ribs delicately fringed.

Obs.—This species is readily distinguished from all the others in the awn of the outer palea being longer than the palea, and the glumes of the calyx distinctly three-ribbed. (See Fig. 4.)

Triticum caninum is distinguished from *Triticum sylvaticum* in the spikelets being much shorter; the whole plant much taller and containing many more spikelets; *glumes* three-ribbed; *inner palea* flat at the summit;—whereas in *T. sylvaticum* the large glume is seven-ribbed, and the *inner palea* rounded at the summit.

From *Triticum repens* in the root being fibrous; *glumes* three-

* *Triticum caninum,* Koch, Smith, Hooker, Greville, Lindley.

ribbed; *awn* of the outer palea longer than the palea;—whereas in *T. repens* the root is extensively creeping; *glumes* more than three-ribbed; *awn* when present not the length of the palea.

Triticum caninum may be considered as one of the most valuable among the early grasses, for, although it does not flower before the first week of July, it affords a large crop of nutritive herbage early in spring, which horses, cows, and sheep eat with avidity. It grows naturally in moist woods and damp shady situations, and will thrive well when cultivated in open places, in almost any kind of soil except that which is tenacious and retentive of moisture.

It is a frequent grass in Scotland, England, and Ireland; also a native of Lapland, Norway, Sweden, Germany, France, Italy, Spain, Portugal, Switzerland, Iceland, and Siberia. Found also in the United States, but is reported to have been introduced. Its limit of altitude is about 500 feet above the sea.

Flowers in the first week of July, and ripens its seed in the early part of August.

90. Triticum repens.*

Creeping Wheat-Grass.

Specific Characters.—Root creeping. Rachis rough. Stem smooth. Leaves smooth on the lower half of the outer surface (Plate LXII.)

Description.—It grows from one to two feet high. The root is perennial, creeping. *Stem* erect, round, *smooth*, and striated, bearing five or six flat leaves with smooth striated sheaths; the upper sheath shorter than its leaf, crowned with a very short obtuse ligule. *Joints* smooth, the two uppermost very remote. *Leaves* dark green, acute, frequently all directed to one side; upper leaf broader than those of the root, roughish, and frequently hairy on the inner surface, smooth behind *on the lower half*. *Inflorescence* spiked. *Spike* erect, about one-fifth the length of the stem, with the margins of the rachis rough. *Spikelets* of an oval form, arranged alternately in two rows on the zig-zag rachis; of four to five awnless florets. *Calyx* of two

* *Triticum repens*, Linn. Koch, Smith, Hooker, Lindley, Greville.

equal acute glumes (Fig. 1), generally four-ribbed, with two or three smaller intermediate ones; the dorsal rib running to a side (Fig. 4.) *Florets* of two paleæ (Fig. 2), the outer palea of lowermost floret, acute, five-ribbed; slightly roughish to the touch. *Inner palea* with two green marginal ribs, minutely toothed.

—— —— *aristatum*, a common variety with the florets awned; the awn about half the length of the palea, very seldom as long as the palea. (Plate LXIII.) It is frequently mistaken for *Triticum caninum;* but differs from it in the glumes having five distinct ribs with two or three small intermediate ones, the dorsal rib running very much to a side. *Awn* seldom more than half the length of the palea, (but never longer than the palea.) Pedicle of second floret rough but not hairy, and the root creeping;—whereas in *Triticum caninum* the glumes have but three ribs, the dorsal rib passing immediately down the centre. Awn longer than the palea. Pedicle of second floret hairy, and the root fibrous.

Triticum repens is distinguished from *Triticum caninum*, in the root being extensively creeping; *glumes* more than three-ribbed; *outer palea* acute, not awned (except in variety *aristatum*);—whereas in *T. caninum* the root is fibrous; *glumes* three-ribbed; *outer palea* tipped with an awn longer than the palea.

From *Triticum junceum*, in the rachis being rough; *glumes* acute and roughish on the upper part of the central rib; *spikelets* easily detached without the rachis breaking;—whereas in *T. junceum* the rachis is perfectly smooth; *glumes* smooth and obtuse; *spikelets* with difficulty detached without breaking the rachis.

This grass is regarded by farmers as a most troublesome weed, being with difficulty eradicated when it once gets possession of the ground, as its long creeping root branches out in every direction, when it becomes a great impoverisher to the soil. It is frequent in neglected gardens and rich cultivated soil. Horses and cows eat it when young, but dislike it when in flower. Dogs eat the leaves medicinally to excite vomiting. It is a common grass throughout Scotland, England, and Ireland; also a native of Norway, Sweden, Germany, France, Spain, Portugal, Switzerland, Italy, Russia, and Iceland. It is found also in the United States, but is supposed to have

been introduced. Its limit of altitude is about 500 feet above the sea.

Flowers in the first week of July, and ripens its seed in the middle of August.

91. Triticum junceum. *

Sea Wheat-Grass.

Specific Characters.—Florets not awned. Rachis smooth. Radical leaves involute. (Plate LXIII.)

Description.—It grows from fifteen inches to two feet high. The root is perennial, creeping. *Stem* erect, round, and smooth, bearing five or six leaves with smooth slightly striated sheaths; upper sheath shorter than its leaf, crowned with a short obtuse membranous ligule. *Joints* three, smooth, situated low down the stem. *Leaves*, as well as the whole plant, glaucous, smooth, and polished; upper leaf broader than the radical ones; hairy on the inner surface; radical leaves rigid, linear, acute, and involute. *Inflorescence* spiked. *Spike* about one-third the length of the stem, with the *rachis perfectly smooth*. *Spikelets* of an oval form, of four or five awnless florets; sessile, arranged alternately in two rows on the zig-zag rachis. *Calyx* of two nearly equal obtuse glumes, (Fig 1), of an oblong form, perfectly smooth, with six prominent ribs, the dorsal or largest rib running very much to a side, (Fig. 4.) *Florets* of two paleæ (Fig. 2), the outer palea of lowermost floret about equal in length to the calyx, of an oval form, perfectly smooth and polished, five-ribbed, of which the dorsal rib occasionally extends slightly beyond the summit. *Inner palea* rather shorter than outer palea, with two green marginal ribs minutely toothed.

Obs.—*Triticum junceum* has been occasionally confounded with glaucous varieties of *Triticum repens*, but is readily distinguished in the rachis being perfectly smooth; *glumes* smooth and obtuse; the *spikelets* not easily detached without breaking the rachis;—whereas in *Triticum repens* the rachis is rough; *glumes* acute and roughish on the upper part of the central rib; the *spikelets* very easily detached without the rachis breaking. (See Plate LXII.)

* *Triticum junceum*, Linn., Koch, Smith, Hooker, Lindley, Greville.

This grass is very seldom eaten by any description of cattle. It is, however, of great use along the coast where it naturally grows, as it assists in binding the loose sand on the sea shore. It is frequent on the sandy shores throughout Scotland, England, and Ireland; also a native of Norway, Sweden, Germany, France, Spain, Portugal, Italy, Russia, North Africa, and West Asia. It has not been discovered in America.

Flowers in the first week of July, and ripens its seed about the middle of August.

92. Elymus arenarius. *

Upright Sea Lime-Grass.

Specific Characters.—Florets hairy. Lowermost floret not longer than the calyx. (Plate LXIV.)

Description.—It grows from two to five feet high. The root is perennial, extensively creeping. *Stem* erect, round, smooth, and finely striated, bearing four or five leaves with smooth striated sheaths, the upper sheath longer than its leaf, crowned with a short obtuse ligule. *Joints* smooth, the first and second remote. *Leaves* long, narrow, hard, and rigid, very glaucous, spinous, pointed, folded or rolled in, strongly grooved, quite smooth behind, rough on the inner surface. *Inflorescence* spiked, dense. *Spike* from four to nine or more inches long, and about half an inch wide, erect, glaucous; rachis smooth, toothed alternately on each side, and flattened just above. *Spikelets* of three or four awnless florets (Fig. 3); arranged in pairs on each tooth of the rachis. *Calyx* of two parallel narrow, acute, nearly equal glumes, about three-ribbed, more or less hairy or woolly (Fig. 1.) *Florets* of two paleæ (Fig. 2); the outer palea of lowermost floret equal in length to the calyx, acute, five-ribbed, hairy. *Inner palea* with two green marginal ribs, delicately fringed; the summit mostly cloven. *Pedicle* of second floret hairy on one side. *Nectary* of two acute hairy scales (Fig 4.) *Ovarium* hairy (Fig. 5.) *Stigmas* feathery. *Styles* short, distinct. *Filaments* capillary. *Anthers* forked at each end.

Obs.—This grass at first sight very much resembles *Ammophila arundinacea*, (Plate VIII.) but is readily distinguished by the ligule

* *Elymus arenarius*, Linn., Koch, Hooker, Lindley, Smith, Withering, Knapp.

being very short and obtuse ; *spikelets* without footstalks, and of three or four florets ;—whereas in *A. arundinacea* the ligule is very long and pointed ; *spikelets* with footstalks and of only one floret.

This grass, says Mr Sinclair, may justly be considered as the sugar cane of Britain, as it is remarkable for the large quantity of saccharine matter it contains. It must necessarily render the hay made from this grass very nutritious, particularly when cut into chaff and mixed with corn or common hay. It grows naturally on the drifted sands of the sea-coast, where it is of great value in arresting and collecting the spreading of the loose sand, forming an effectual barrier to repel the encroachments of the sea. It is a frequent grass along some parts of the sandy shores of Scotland and Ireland. In England it occurs along the coast of Northumberland, Durham, Cumberland, Lincoln, Carnarvon, Cardigan, Norfolk, Dorset, and Devon ; also a native of Lapland, Norway, Sweden, Germany, France, Spain, Portugal, Italy, Iceland, and British America. It has not been discovered in the United States.

Flowers in the second week of July, and ripens its seed about the end of August.

93. Lolium temulentum.
Bearded Rye-Grass.

Specific Characters.—Florets awned. Glume longer than the spikelet. (Plate LXIV.)

Description.—It grows to the height of two feet. The root is annual, fibrous. *Stem* round, smooth, (sometimes roughish), bearing four leaves with smooth striated sheaths ; the upper sheath shorter than its leaf, crowned with a short obtuse ligule. *Joints* four, smooth. *Leaves* flat, lanceolate, acute, rough on both surfaces, except at the base of the under surface ; the margins minutely toothed. *Inflorescence* spiked. *Spike* erect, about a span long. *Spikelets* sessile, arranged alternately in two rows on the ziz-zag rough rachis, of four or five awned florets. *Calyx* of one glume, (sometimes accompanied with a very short inner glume), long and narrow, with eight ribs,

* *Lolium temulentum*, Linn., Koch, Smith, Hooker Lindley.

five of which are rather indistinctly seen (Fig. 1); *longer* than the spikelet, smooth, and somewhat roughish at the edges. *Florets* of two paleæ (Fig. 2); the outer palea of lowermost floret *seven*-ribbed, the marginal ribs the broadest; bifid at the summit, and furnished with a white rough *awn*, rather more than half the length of the palea (occasionally the awn is much longer), arising immediately behind the bifid extremity. *Inner palea* with two green marginal ribs, minutely fringed. Seeds elliptical, somewhat flattened.

Obs.—*Lolium temulentum* differs from *Lolium perenne*, in the glume being longer than the spikelet, and the outer palea furnished with a delicate awn;—whereas in *L. perenne*, the glume is shorter than the spikelet, and the florets have no awn.

This grass is found principally in cultivated fields, especially among corn, where it is a noxious weed. The seeds, it is said, when eaten produce vomiting, purging, violent colic, and death; and Linnæus states that the seeds when mixed with bread produce but little effect unless when eaten hot; but if malted with barley, the ale soon occasions intoxication.

It is occasionally found in Scotland and Ireland, but more frequently in England, especially in the counties of Northumberland, Durham, York, Notts, Anglesea, Carnarvon, Worcester, Beds, Cambridge, Suffolk, Essex, Kent, Sussex, and Devon; also a native of Norway, Sweden, Germany, France, Italy, North Africa, Japan, South America and the United States.

Flowers in the first week of July, and ripens its seed in the beginning of August.

94. Lolium perenne.*

Rye-Grass.

Specific Characters.—Florets not awned. Glume shorter than the spikelet. (Plate LXV.)

Description.—It grows from fifteen inches to two feet high. The root is perennial, fibrous. *Stem* erect, round, smooth, and finely striated, bearing six or seven leaves with smooth striated sheaths;

* *Lolium perenne*, Linn. Hooker, Smith, Lindley, Greville, Koch.

the upper sheath longer than its leaf, crowned with a short obtuse ligule; the lower sheaths shorter than their leaves. *Joints* four or five, smooth, often purplish, the first and second rather remote. *Leaves* dark-green, lanceolate, acute, flat, smooth on the outer surface, and roughish on the inner. *Inflorescence* spiked. *Spike* compressed, erect or slightly curved, about one-third the length of the stem; rachis smooth. *Spikelets* sessile, arranged on the rachis alternately in two rows; of six to twelve *awnless* florets. *Calyx* of one glume (Fig. 1) of an oblong-lanceolate form, smooth, and five-ribbed; situated on the outer side, and shorter than the spikelet. *Florets* of two paleæ, (Fig. 2), the outer palea of lowermost floret shorter than the glume, smooth, *five*-ribbed, membranous, and entire at the summit. *Inner palea* linear-lanceolate, equal in length to the outer palea, with two green marginal ribs delicately fringed. *Filaments* slender, shorter than the palea. *Anthers* cloven at each end. *Germen* obtuse. *Styles* very short. *Stigmas* feathery along the upper side. *Seed* elliptic-oblong, channeled in front.

Obs. —— —— *racemosum*, a frequent variety, with the spikelets pedunculated. (Plate LXV.)

—— —— *angustifolium*, a tall and slender variety, with long narrow leaves.

—— —— *tenue*, a small starved variety, with the spikelets of three or four florets.

—— —— *Italicum*, (Italian rye-grass, Plate LXV.) This variety is an exotic introduced into this country about ten years ago by Mr Lawson, and is now becoming a very frequent grass in the neighbourhood of Edinburgh, as well as throughout the cultivated districts of Scotland. It differs from *Lolium perenne*, in the florets having long slender awns; and from *Lolium temulentum*, in the glumes being shorter than the spikelets. It is a most valuable grass, well deserving the attention of agriculturists, as producing a large produce of herbage early in spring, which horses, cows, and sheep are remarkably fond of, and will bear cutting three times during the season, especially when cultivated in moist rich soils or irrigated meadows. The only disadvantage that this grass possesses is, that it does not seem to be strictly a perennial.

Of *Lolium perenne* there are a great number of varieties known to farmers by various appellations; all more or less valuable for agricultural purposes, viz. *Slender rye-grass, Broad spiked rye-grass, Pacey's rye-grass, Russell's grass, Whitworth's grass, Stickney's grass, Panicled rye-grass, Double-flowered rye-grass, Viviparous rye-grass,* besides a great number of others, amounting to at least seventy varieties. Mr Sinclair states, that there has been much difference of opinion respecting the merits and comparative value of rye-grass. It produces an abundance of seed, which is easily collected, and readily vegetates on most kinds of soils, under circumstances of different management. It soon arrives at perfection, and produces in its first years of growth a good supply of early herbage, which is much liked by cattle: but the after-crop of rye-grass is very inconsiderable, and the plant impoverishes the soil in a high degree, if the culms, which are invariably left untouched by cattle, are not cut before the seed advances towards perfection. When this is neglected, the field after midsummer exhibits only a brown surface of withered straws.

For permanent pasture, the produce and nutritive powers of the rye-grass, compared with those of the cock's-foot grass, (*Dactylis glomerata*), are inferior nearly in the proportion of five to eighteen; and inferior to the meadow fox-tail (*Alopecurus pratensis*) in the proportion of five to twelve; and inferior to the meadow fescue (*Bucetum pratense*) as five to seventeen. The rye-grass is but a short-lived plant, seldom continuing more than six years in possession of the soil, but is continued by its property of ripening an abundance of seed, which is but little molested by birds, and suffered to fall and vegetate among the root-leaves of the permanent pasture-grasses. It is only within these last forty or fifty years that other species of grasses have been tried as a substitute for the rye-grass in forming artificial pastures, it having been the favourite grass with most farmers from the time of its first cultivation in 1674 to the present period.

The rye-grass, when not more than three years old, flowers in the second week of June, and ripens its seed in about twenty-five days after: as the plants become older they flower much later, sometimes so late as the beginning of August. It is a very common grass throughout the whole of Britain; also a native of Lapland, Norway,

Sweden, Germany, France, Spain, Portugal, Switzerland, Italy, Russia, North of Africa, and West of Asia. It occurs also in the United States, but is stated to have been introduced from Europe. Its limit of altitude seems to be about 1000 feet above the sea.

The following new species of grass was sent me by Professor Balfour after the preceding sheets had passed through the press:—

Poa Balfouri. *

St. John's Meadow-Grass.

Specific Characters.—Florets slightly webbed. Ligule prominent, obtuse. Upper leaf nearly as long as its sheath. Outer palea five-ribbed. Stem compressed.

Description.—It grows from three to fifteen inches high. The root is perennial, creeping. *Stem* erect, compressed, furnished with a few minute spicula, with their points directed upwards, producing a slight roughness to the touch; bearing three or four leaves, with scarcely smooth sheaths; the upper sheath a very little longer than its leaf, crowned with a prominent, obtuse ligule (Fig. 5); second sheath shorter than its leaf, covering the upper joint. *Joints* three, situated on the lower third of the stem. *Leaves* confined to the lower part, leaving nearly two-thirds of the stem naked; all the leaves about equal lengths, short, lanceolate, roughish on the upper surface and edges, smooth behind. *Inflorescence* simple or compound panicled. *Panicle* erect, from one to three inches long, spreading when luxuriant; the branches slender, rough, the lower ones mostly in pairs. *Spikelets* erect, ovate, of three awnless florets, the summit of the lowermost floret on a level with the apex of the large glume of the calyx; the three or four uppermost spikelets arising from the rachis, the lower ones on lateral branches. *Calyx* of two unequal acute glumes (Fig. 1), three-ribbed, the dorsal rib minutely toothed on the upper third, margins membranous. *Florets* of two paleæ, (Fig. 2); the outer palea of lowermost floret equal in length to the large glume of the calyx, five-ribbed, the rib on each side of the dorsal rib not hairy, and rather indistinct, (unless the palea be opened, and held between the lens and light); lower half of the dorsal and marginal ribs hairy; base of the two lowermost florets furnished with three or four long silky convoluted hairs, which seem but slightly attached to the calyx. *Inner palea* about equal in length to the outer palea, with two green marginal ribs minutely

* *Poa Balfouri*, Parnell,—so named in honour of Dr Balfour, Professor of Botany in the University of Glasgow.

fringed. *Pedicle* of second floret slightly hairy. *Filaments* three. *Anthers* notched at each extremity. *Ovarium* obovate. *Styles* two, distinct. *Stigmas* feathery. *Scales* acute, notched ; (Fig. 6.)

—— —— *rigida.*—A short stout variety from three to five inches high, with a short simple panicle of few spikelets. Found in exposed situations at an elevation of 2500 feet above the sea.

—— —— *extensa.*—A tall and slender variety, growing from eight to twelve inches in height, with a simple panicle of few spikelets. Found at an elevation of about 2000 feet above the sea.

Obs.—This grass is closely allied to *Poa nemoralis,* but differs from it in the *ligule* of the upper sheath being prominent ; *upper leaf* scarcely as long as its sheath ; all the *joints* situated on the lower third of the stem, and covered by the sheaths ; *stem* slightly roughish ;—whereas in *P. nemoralis* the *ligule* is very short ; *upper leaf* as long and often longer than its sheath ; *upper joint* situated not below the centre of the stem, and not covered by the second sheath ; *stem* smooth. (Plate XXXVI.)

From *Poa montana,* in the *florets* being webbed ; *upper joint* situated on the lower third of the stem ; *lower floret* equal in length to the large glume of the calyx ;—whereas in *P. montana* the florets are not in the slightest degree webbed ; upper joint situated about halfway up the stem ; lower floret shorter than the large glume ; the *panicle* longer and more slender, of fewer spikelets on longer foot-stalks ; the *leaves* more taper-pointed. (Plate XXXIX.)

From *Poa polynoda,* in the *florets* being webbed ; *joints* not exceeding three in number, situated on the lower third of the stem ; *upper joint* covered by the second sheath ;—whereas in *P. polynoda* the *florets* are not webbed ; *joints* six or seven in number ; *upper joint* situated above the centre of the stem, and not covered by the second sheath. (Plate XXXIX.)

From *Poa cæsia,* in the *florets* being webbed ; *lower floret* equal in length to the large glume of the calyx ;—whereas in *P. cæsia* the *florets* are not webbed, and the *lower floret* is longer than the large glume of the calyx ; the *spikelets* are larger, and the glumes of the calyx nearly equal. (Plate XL.)

From *Poa compressa,* in the *outer palea* being five-ribbed ; *spikelets*

of three florets; joints three, confined to the lower third of the stem; —whereas in *P. compressa* the outer palea is but three-ribbed; spikelets of five to seven florets; joints usually five in number, the upper one situated about the centre of the stem. (Plate XXXVII.)

From *Poa pratensis*, in the florets being but slightly webbed; stem very much compressed and slightly roughish to the touch; upper leaf a very little shorter than its sheath; spikelets of three florets;—whereas in *P. pratensis* the florets are copiously webbed, suspending the calyx by their silky hairs; stem smooth and round, (except in variety *planiculmis*, in which the stem is slightly compressed); *upper leaf* much shorter than its sheath; *spikelets* usually of five florets. (Plate XXXI.)

Poa Balfouri is found on Ben Voirlich, Perthshire; also on the Clova mountains, Forfar, growing on micaceous soil, at an elevation of between 2000 to 2500 feet above the sea. Sheep seldom eat this grass, as they give a preference to the *Festuca ovina*, which grows in abundance in the same situations.

Flowers in the first week of July, and ripens its seed in August.

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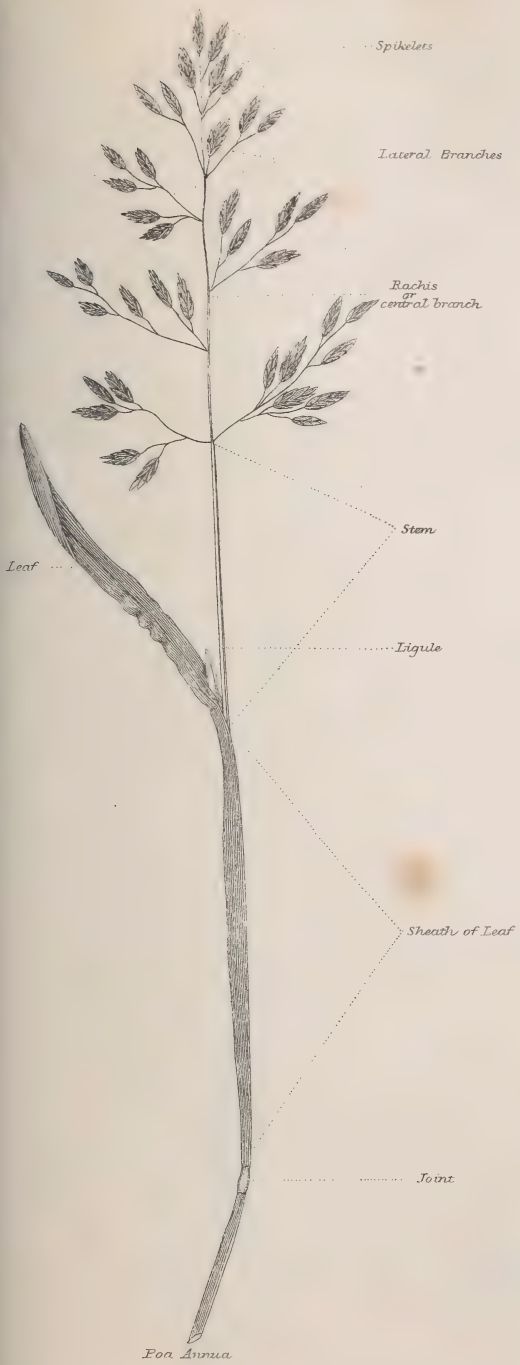
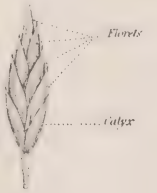
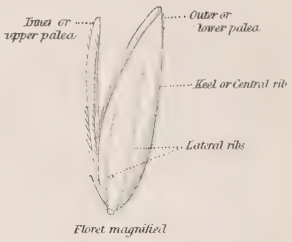
ERRATA.

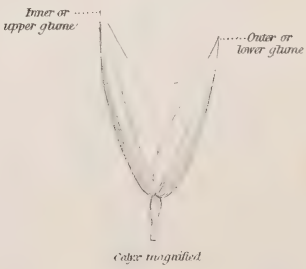
Pages 45, 46, *for* Molinea, *read* Molinia.
—— 106, 108, 109, *for* Bucetum elatior, *read* Bucetum elatius.
—— 122, *for* Avena pratense, *read* Avena pratensis.

DISSECTION OF THE COMMON ANNUAL MEADOW-GRASS









R. Parnell M.D. delt et sculpt.

Printed by J.Gellatly.

Published by Wm Blackwood & Sons, Edinburgh & London.

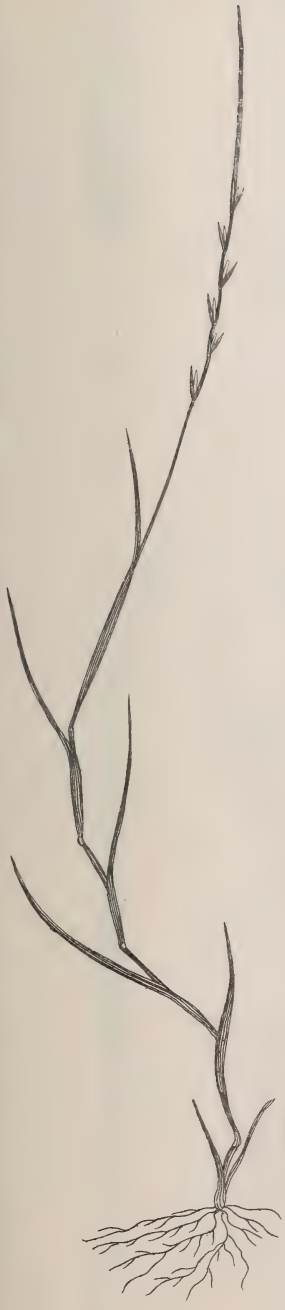
Nardus stricta *Rottbollia incurvata*

R. Parnell M.D. delt et sculpt

Printed by J.Gellatly.

Published by Wm Blackwood & Sons, Edinburgh & London.

PLATE III



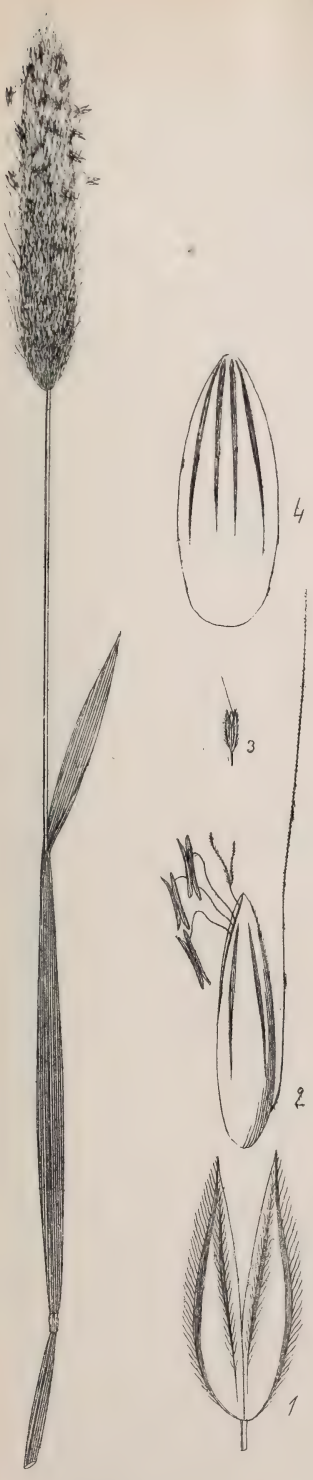
——— filiformis

Alopecurus agrestis

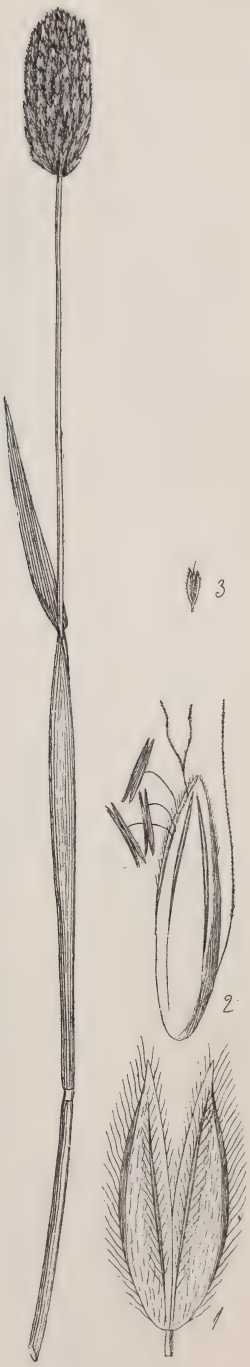
R. Parnell M.D. delt et sculpt.

Printed by J.Gellatly.

Published by Wm. Blackwood & Sons, Edinburgh & London.



Alopecurus pratensis

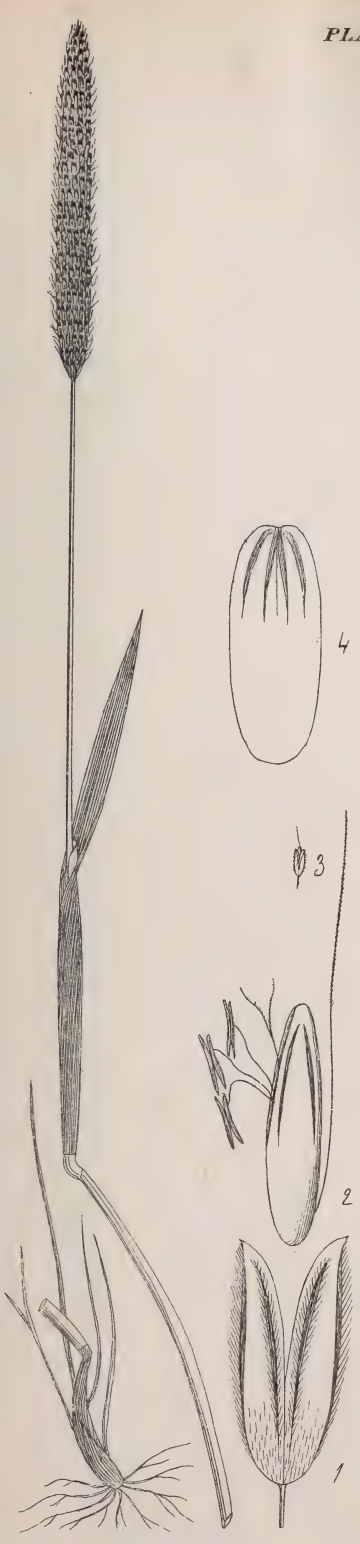


Alopecurus alpinus

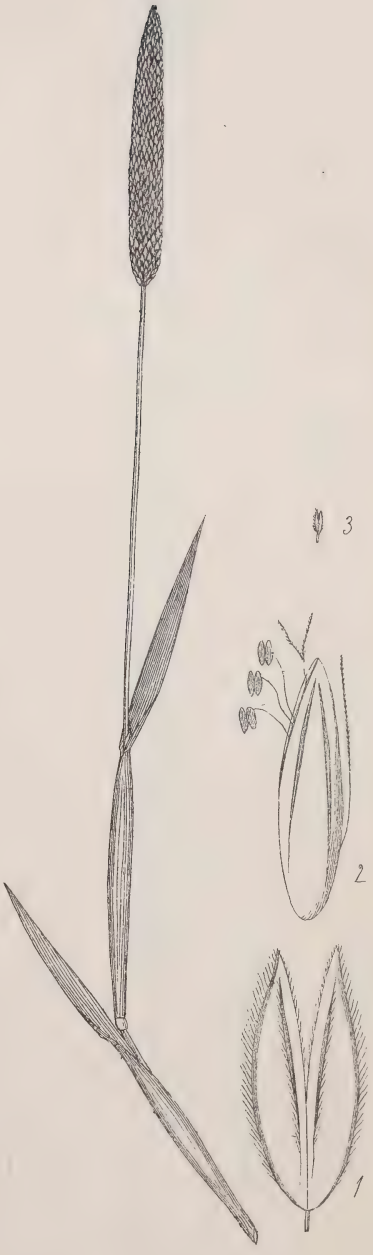
R. Parnell M.D. delt et sculpt

Printed by J.Gellatly.

Published by Wm Blackwood & Sons, Edinburgh & London.



Alopecurus geniculatus

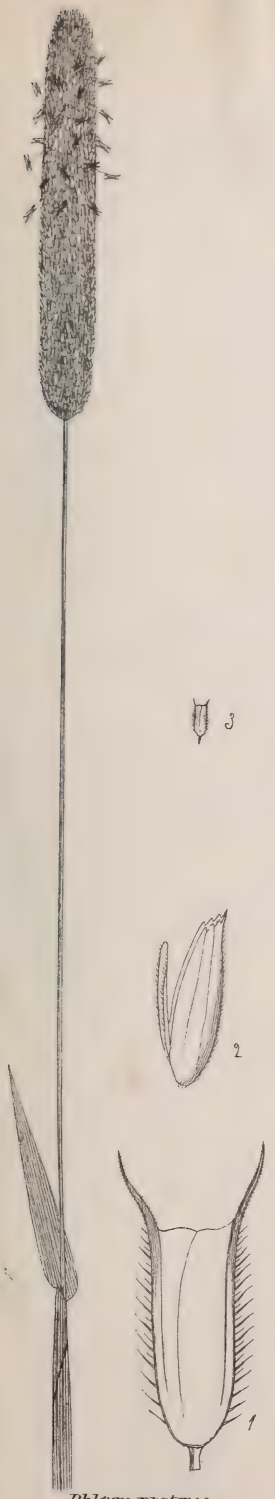


Alopecurus fulvus

R. Parnell M D. delt et sculpt.

Printed by J. Gellatly.

Published by Wm Blackwood & Sons, Edinburgh & London.



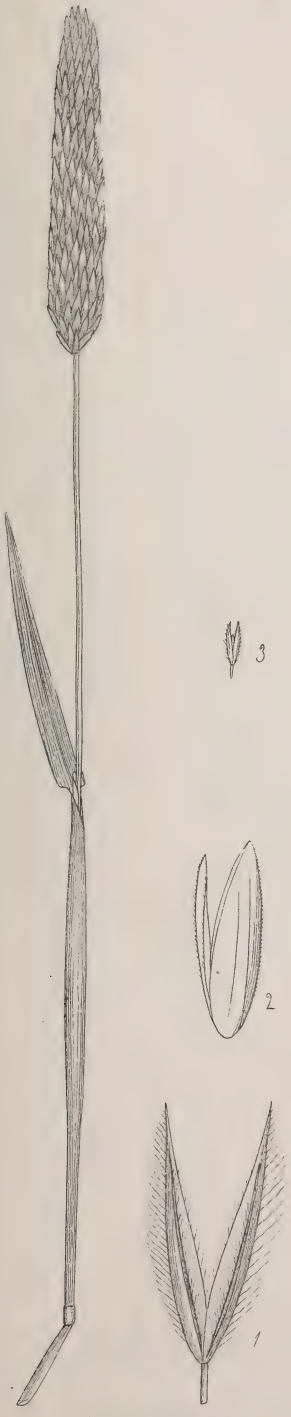
Phleum pratense

Phleum alpinum

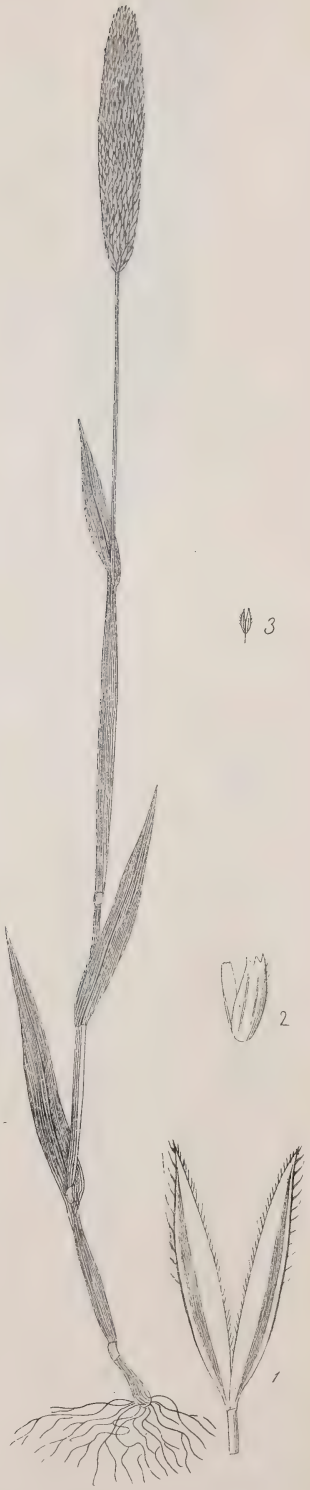
R. Parnell M.D. delt et sculpt

Printed by J. Gellatly.

Published by Wm Blackwood & Sons, Edinburgh & London.



Phleum Michelii

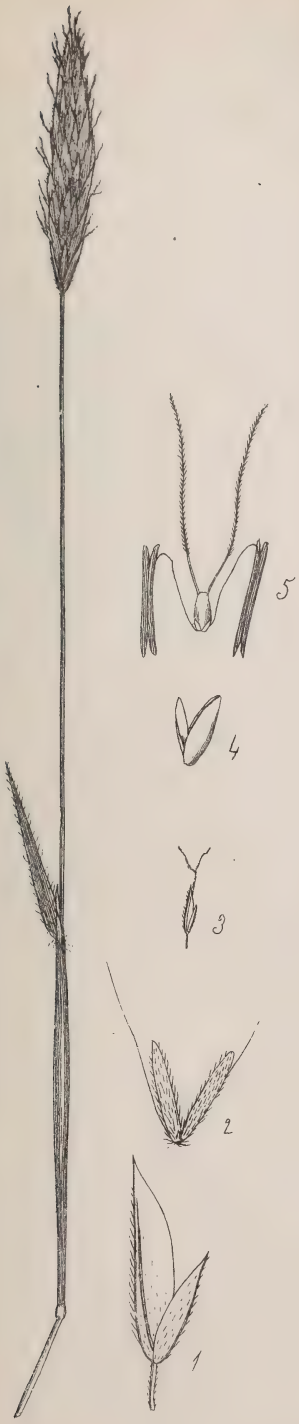


Phleum arenarium

R. Parnell M.D. delt et sculpt

Printed by J.Gellatly.

Published by Wm Blackwood & Sons, Edinburgh & London.



Anthoxanthum odoratum

Ammophila arundinacea

R. Parnell. M.D. delt et sculpt

Printed by J.Gellatly.

Published by Wm. Blackwood & Sons, Edinburgh & London.

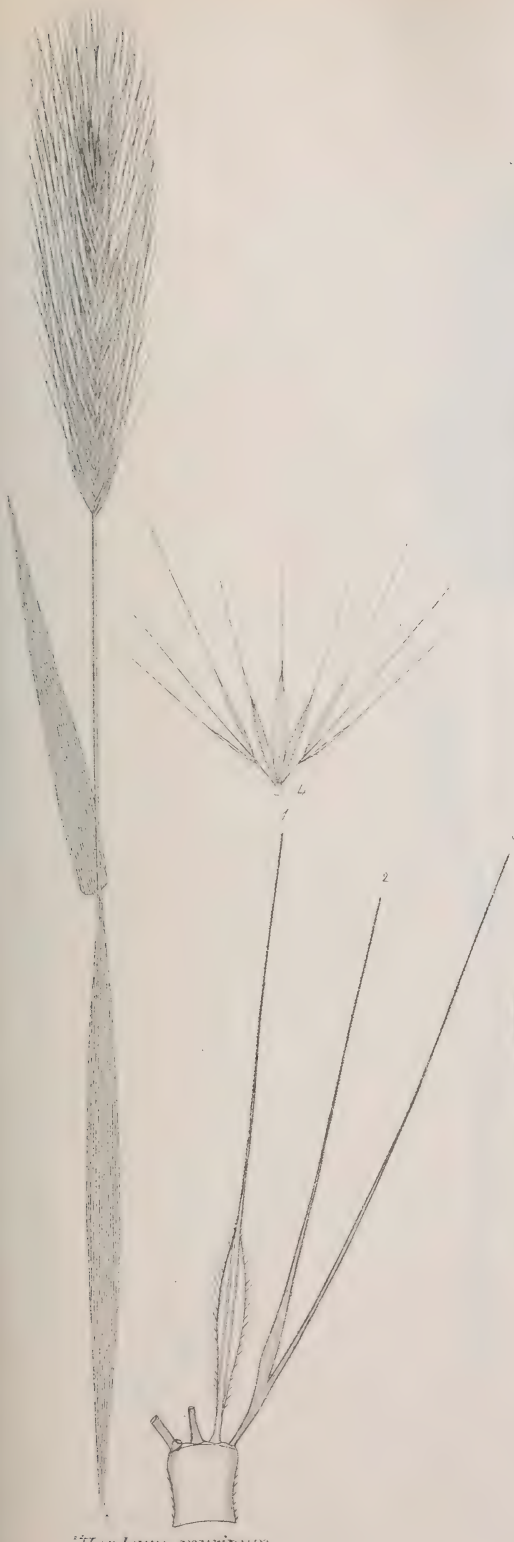
Phalaris canariensis

Phalaris arundinacea

Sowerby del. et sculpt.

Printed by J.Gellatly.

Published by Wm Blackwood & Sons, Edinburgh & London .



Hordeum maritimum

Hordeum maritimum

R. Parnell, M.D. del. et sculpt.

Printed by A. Gellatly.

Published by Wm Blackwood & Sons, Edinburgh & London.

PLATE XI

Hordeum pratense

Polypogon monspeliensis

R. Parnell, M.D. delt et sculpt.

Printed by J.Gellatly.

Published by Wm Blackwood & Sons, Edinburgh & London.

Agrostis vulgaris

—— —— *pumila*

R. Parnell. M.D. delt. et sculp.

Printed by J.Gellatly.

Published by Wm Blackwood & Sons, Edinburgh & London.

Agrostis alba

R. Parnell M.D. del. et sculpt.

Printed by A. Gellatly.

Published by Wm Blackwood & Sons, Edinburgh & London

PLATE XIV

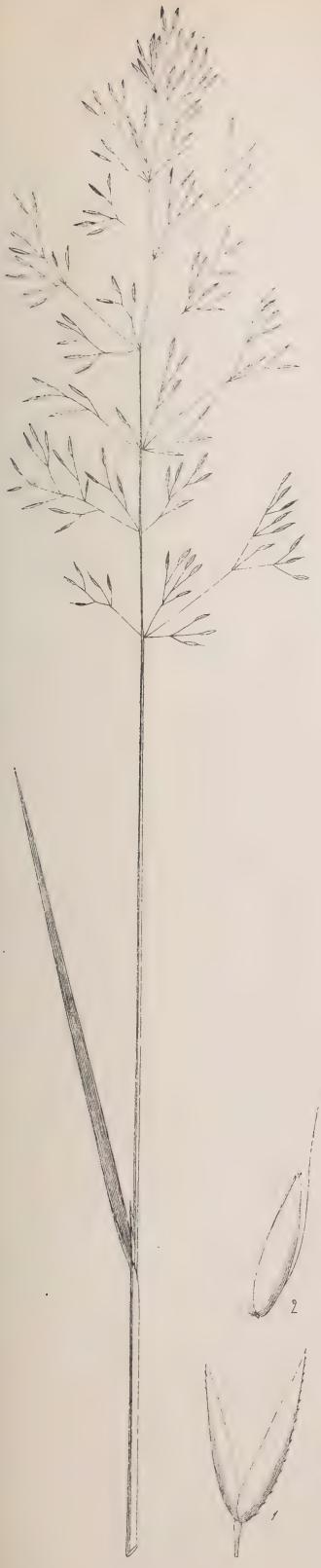
——— *stolonifera*

——— *palustris*

R. Parnell, M.D. delt et sculp.

Printed by J. Gellatly.

Published by Wm. Blackwood & Sons, Edinburgh & London.



Agrostis canina

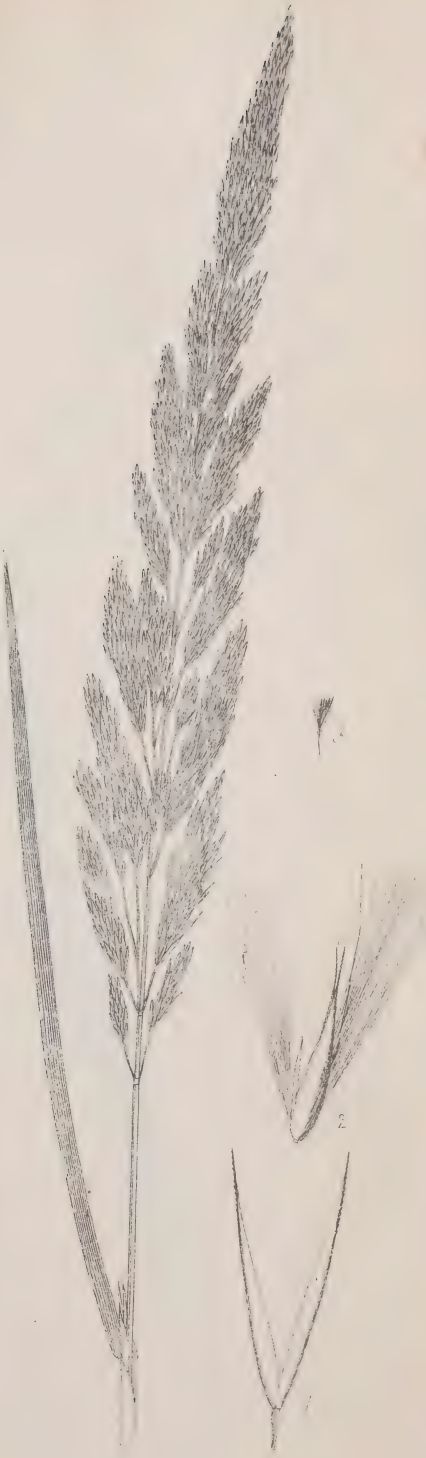
—— alpina

rnell M.D. delt et sculpt

Printed by J.Gellatly.

Published by Wm Blackwood & Sons, Edinburgh & London.

Calamagrostis stricta.



Calamagrostis Epigegos

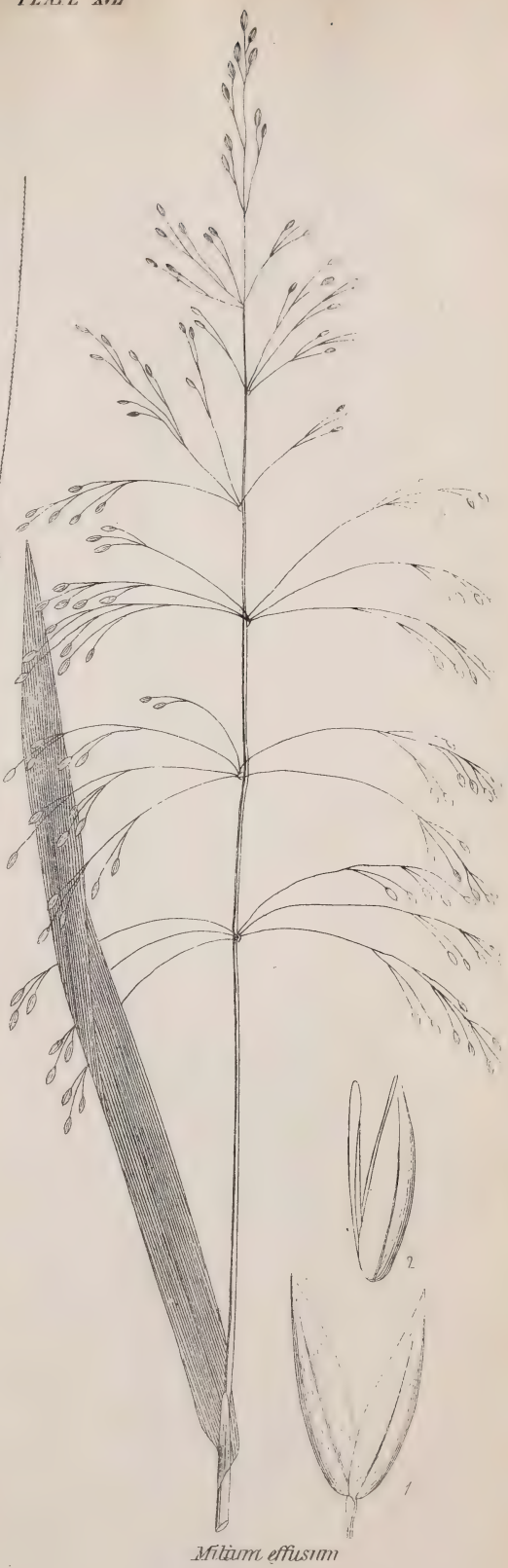
R. Parnell, M.D. delt. et sculpt.

Printed by J. Gellatly.

Published by Wm Blackwood & Sons Edinburgh & London.

PLATE XVII

Anemagrostis spica venti



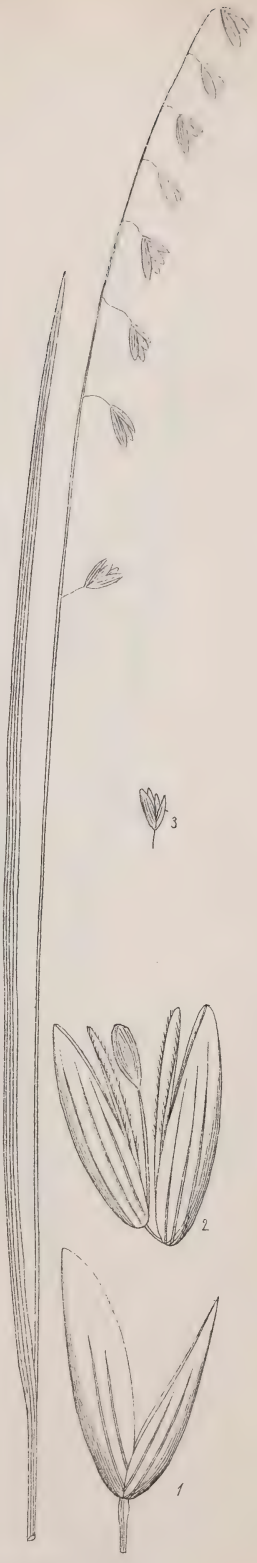
Milium effusum

rnell. M.D. delt. et sculp.

Printed by J.Gellatly.

Published by Wm Blackwood & Sons, Edinburgh & London.

Melica uniflora

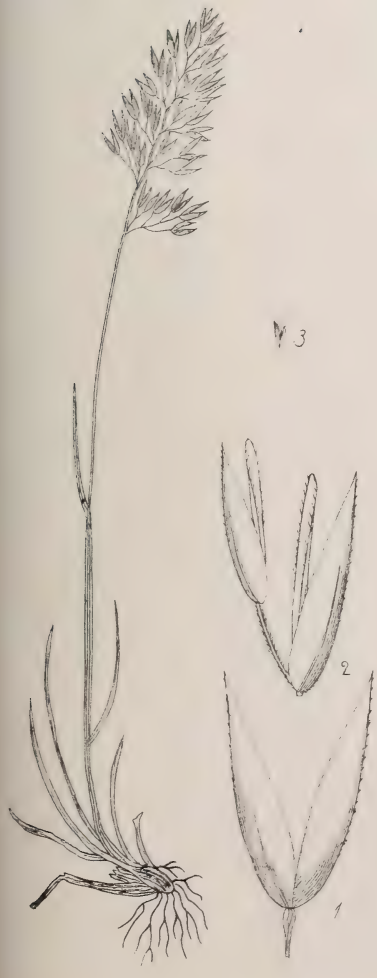


Melica nutans

R. Parnell M.D. delt. et sculpt.

Printed by J.Gellatly.

Published by Wm Blackwood & Sons, Edinburgh & London.



Airochloa cristata.

Molinea depauperata

Printed by J. Gellatly.

Published by Wm Blackwood & Sons, Edinburgh & London.

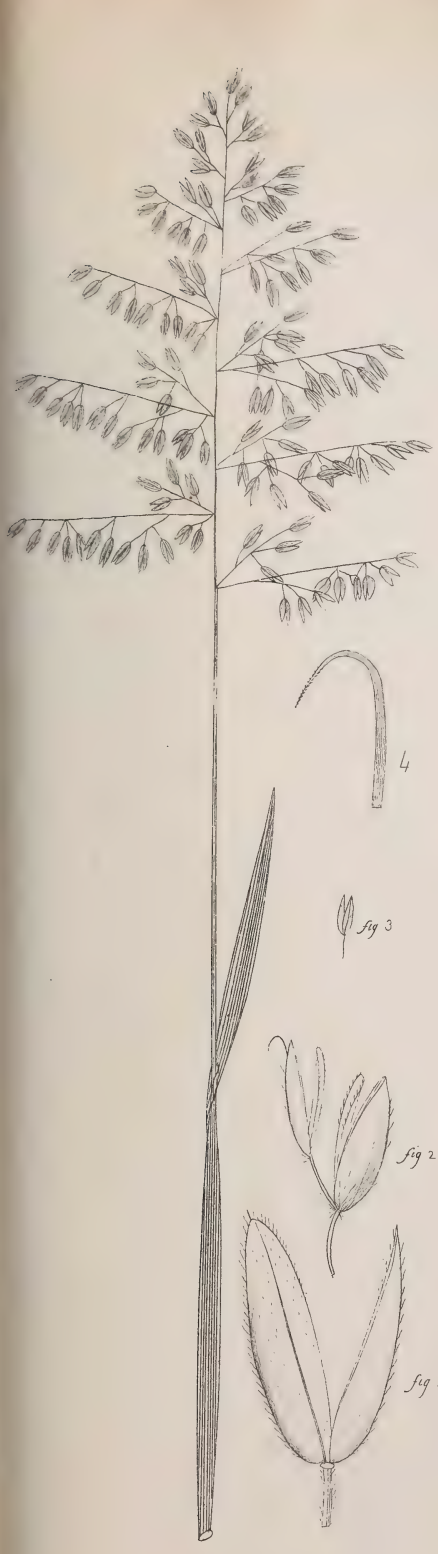
Molinea cærulea

Catabrosa aquatica

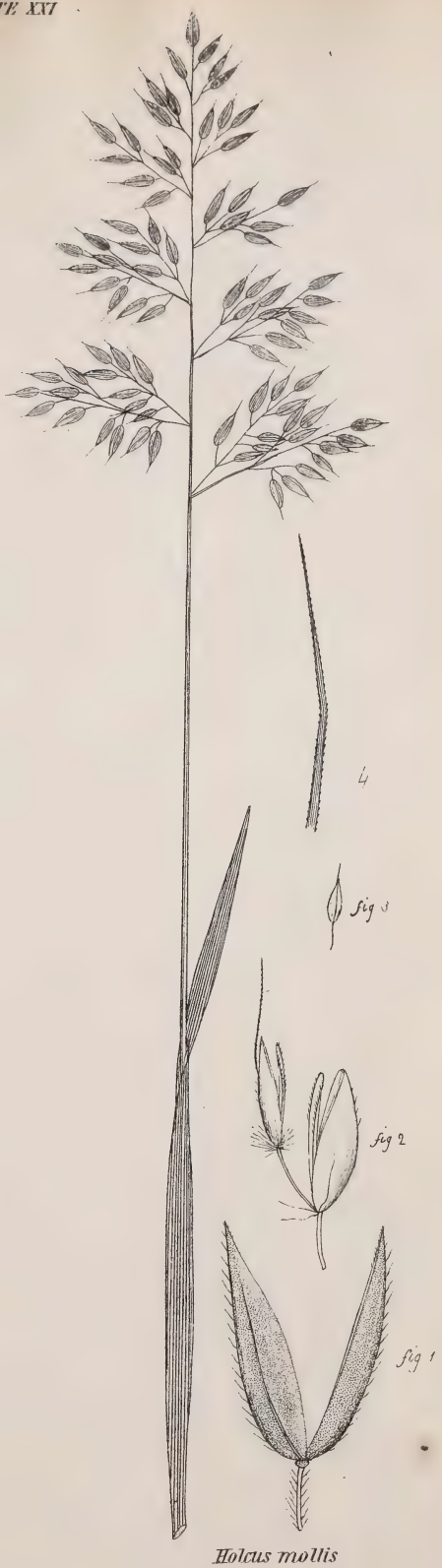
F. Purnell M.D. delt et sculpt

Printed by J. Gellatly.

Published by Wm. Blackwood & Sons, Edinburgh & London.



Holcus lanatus



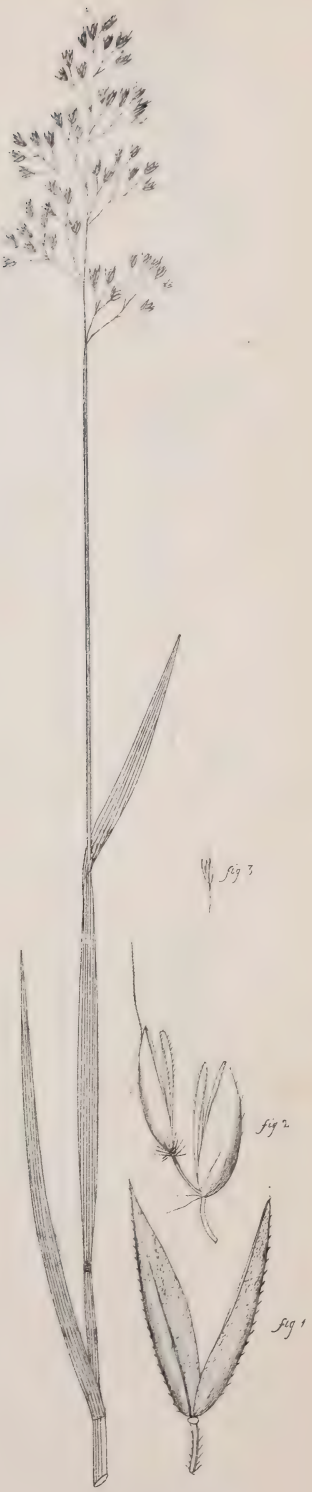
Holcus mollis

R. Parnell M.D. delt et sculpt

Printed by J.Gellatly.

Published by Wm Blackwood & sons, Edinburgh & London.

—— —— *biaristatus*

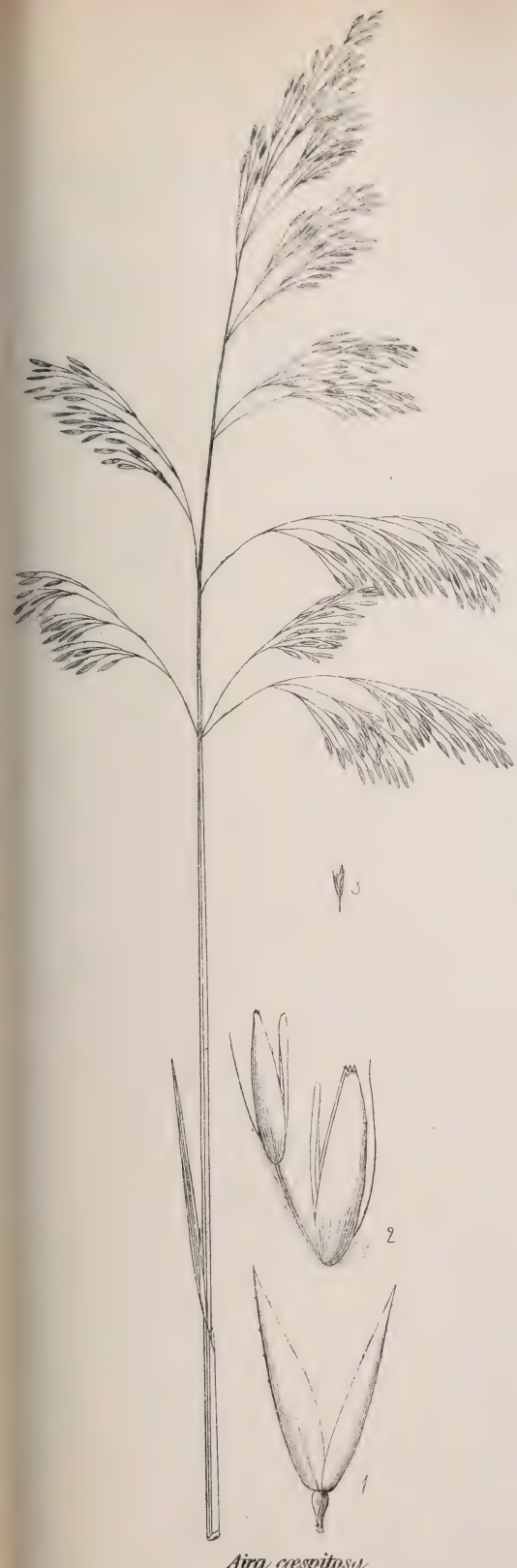


—— —— *parviflorus*

R. Parnell M.D. delt. et sculpt.

Printed by J. Gellatly.

Published by Wm. Blackwood & Sons, Edinburgh & London.



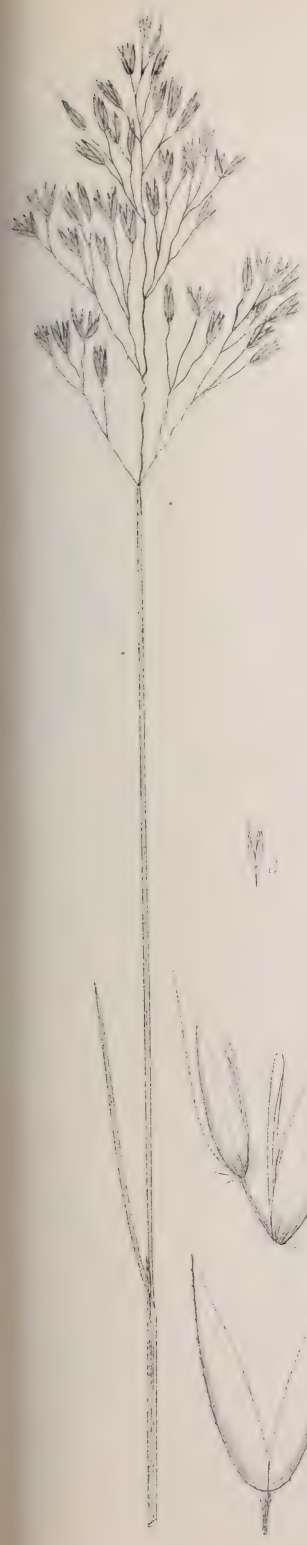
Aira cæspitosa

Aira alpina

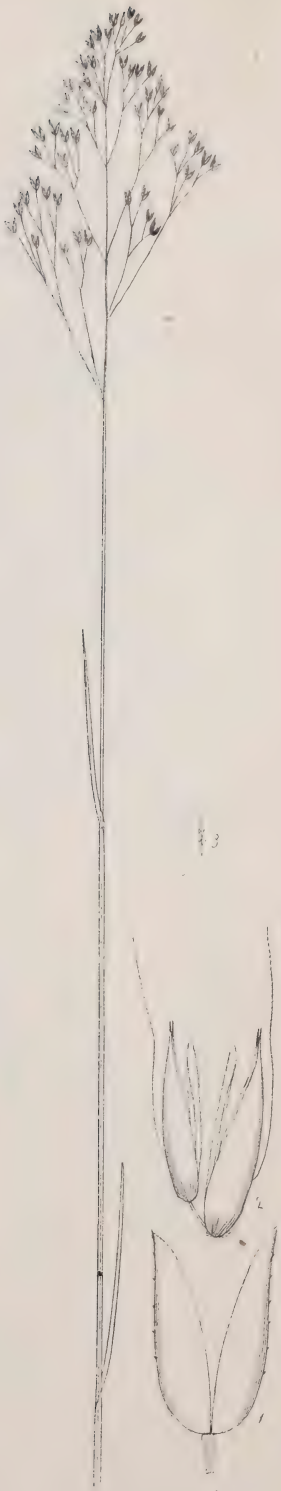
R. Parnell. M.D. delt. et sculpt.

Printed by J.Gellatly.

Published by Wm Blackwood & Sons, Edinburgh & London.



Aira flexuosa

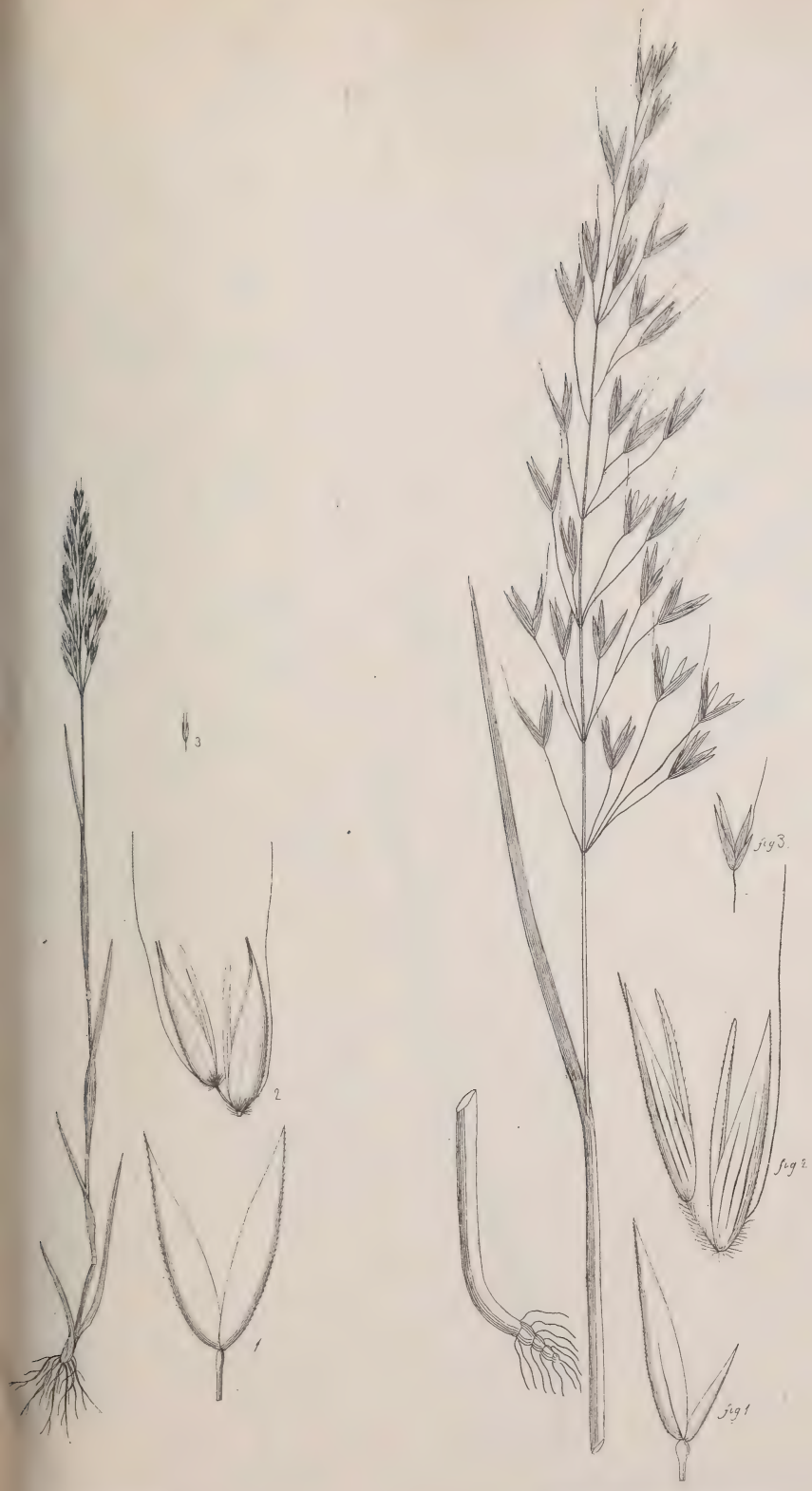


Aira caryophyllea

Parnell M.D. delt et sculp.

Printed by J.Gellatly.

Published by Wm. Blackwood & Sons, Edinburgh & London.



Aira præcox

Arrhenatherum avenaceum

rnell M.D. delt. et sculpt.

Printed by J.Gellatly.

Published by Wm Blackwood & Sons, Edinburgh & London.

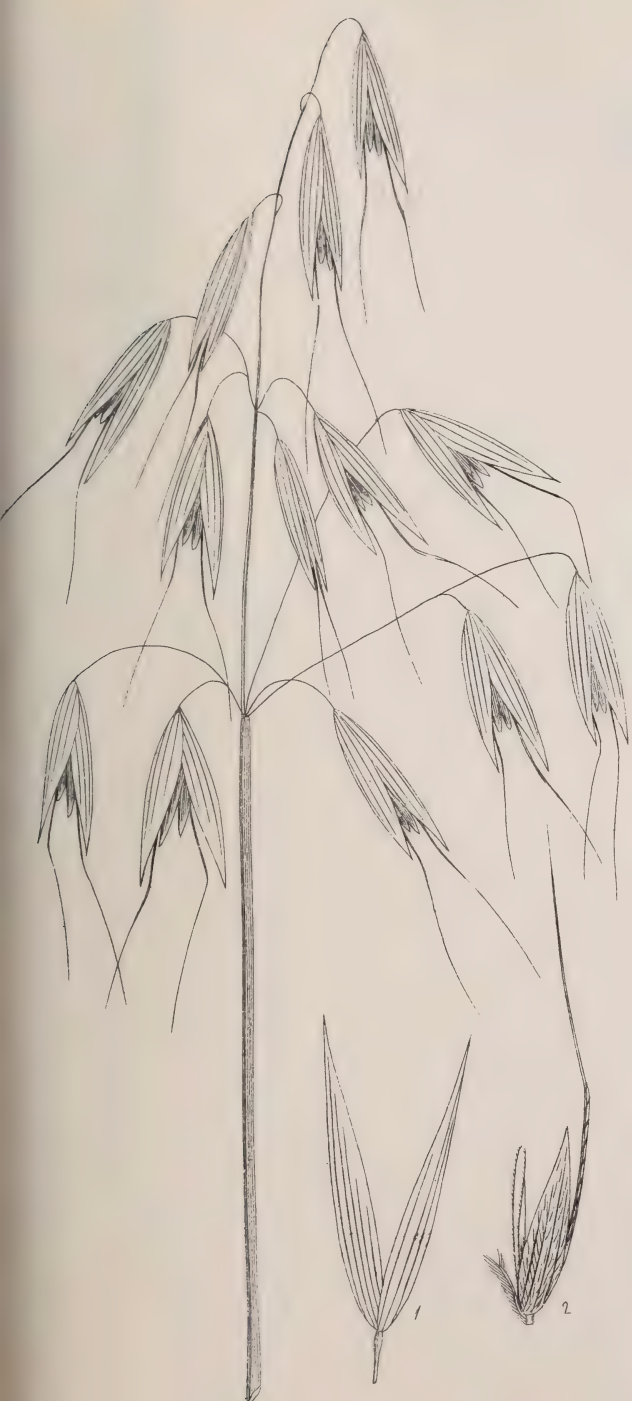
——— bulbosum

Avena strigosa

R. Parnell M.D. delt et sculpt

Printed by J.Gellatly.

Published by Wm Blackwood & Sons, Edinburgh & London.



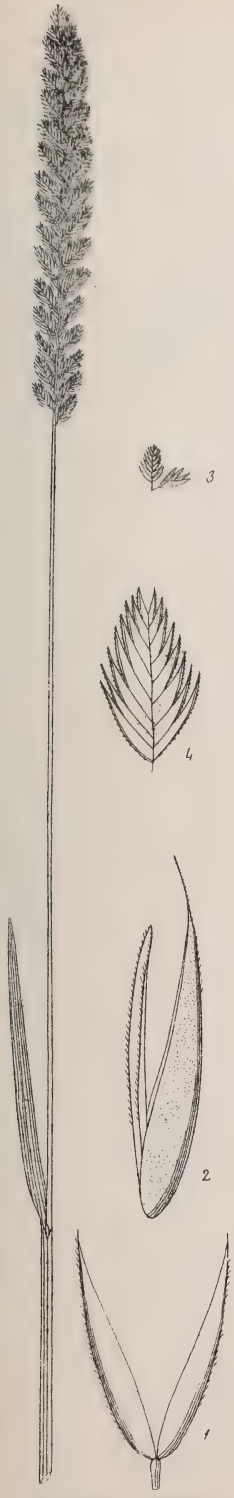
Avena fatua

Sesleria cærulea

R. Parnell M.D. delt et sculpt.

Printed by J.Gellatly.

Published by Wm Blackwood & Sons, Edinburgh & London.



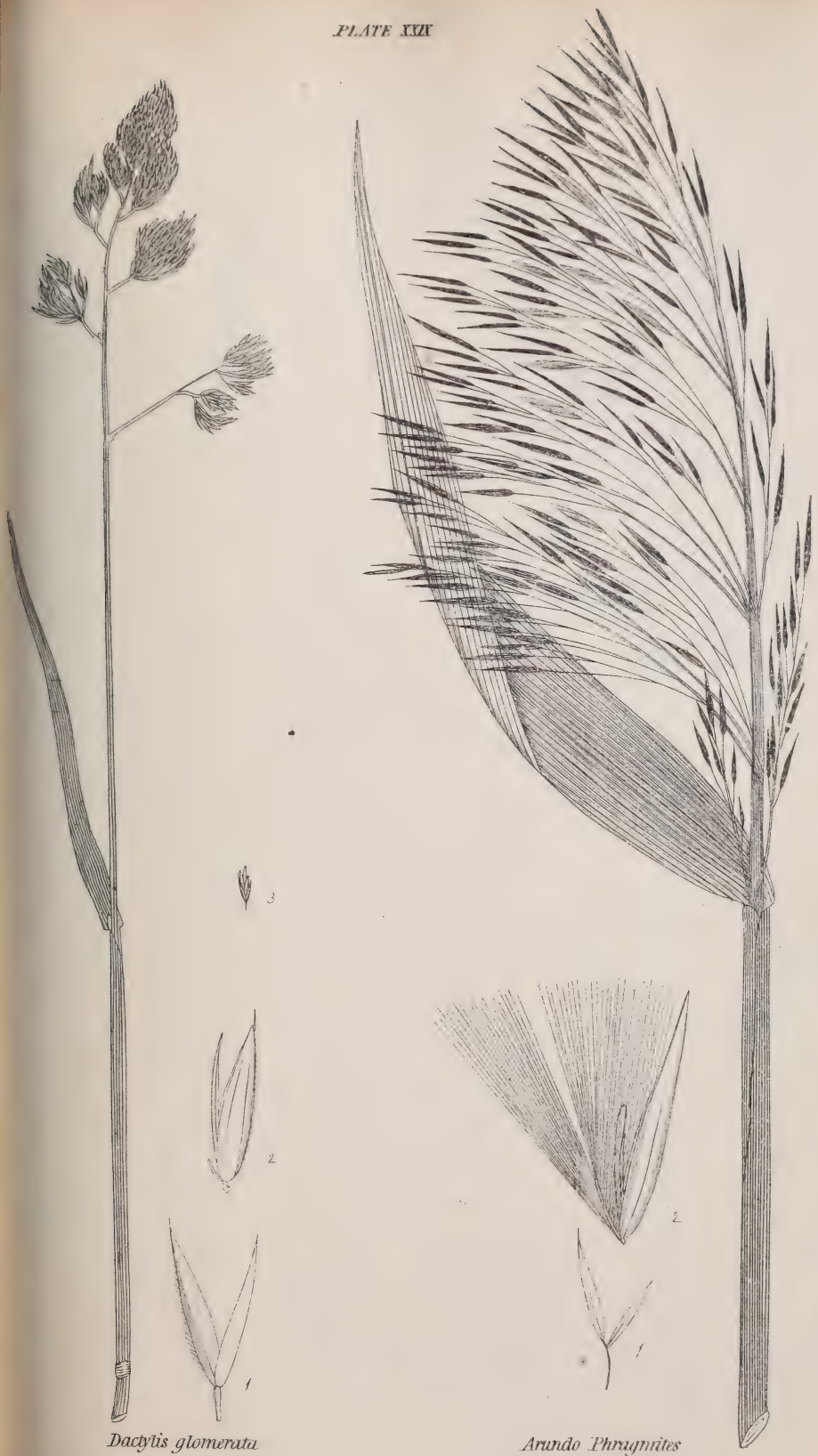
Cynosurus cristatus

Cynosurus echinatus

R Purnell M.D. delt et sculpt

Printed by J Gellatly.

Published by Wm Blackwood & Sons, Edinburgh & London.



Dactylis glomerata

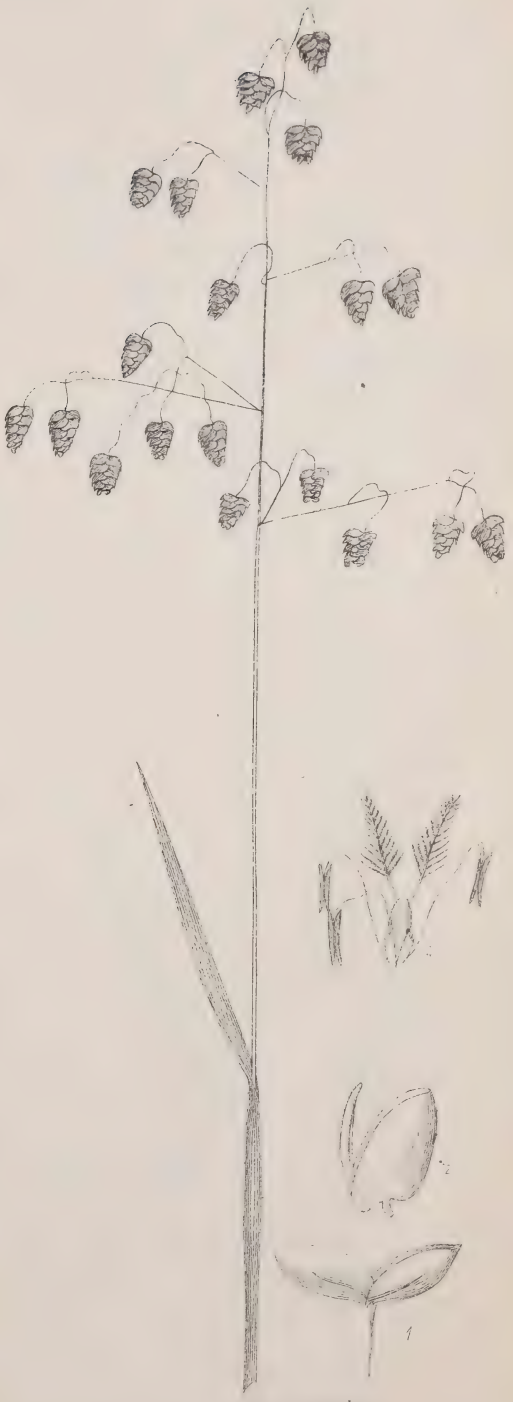
Arundo Phragmites

Parnell M.D. delt. et sculpt.

Printed by J.Gellatly.

Published by Wm Blackwood & Sons, Edinburgh & London

Triodia decumbens



Briza media

R. Parnell M.D. delt. et sculp.

Printed by J. Gellatly.

Published by Wm. Blackwood & Sons, Edinburgh & London.

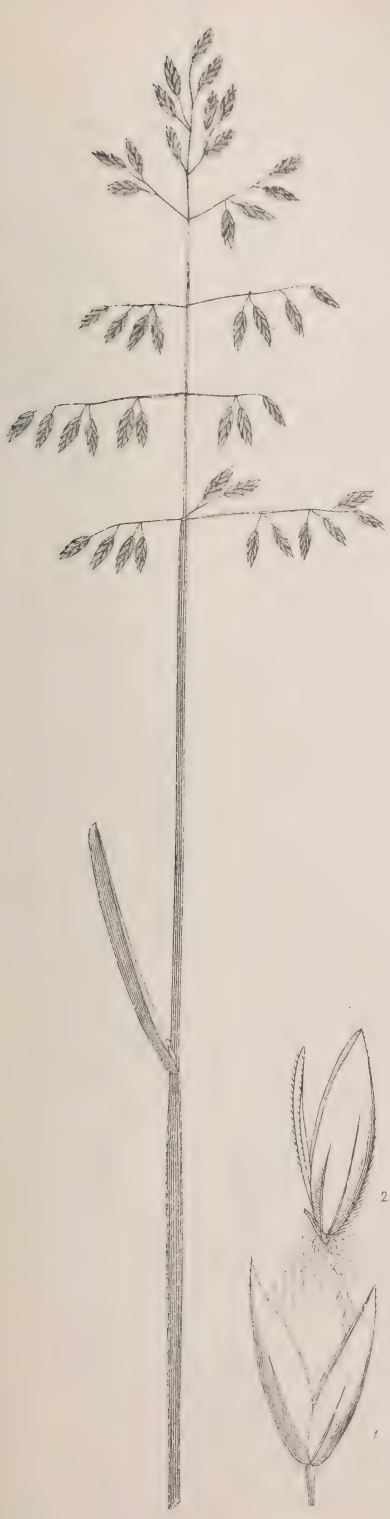
Hierochloe borealis

Poa pratensis

R. Parnell, M.D. delt et sculpt.

Printed by J.Gellatly.

Published by Wm Blackwood & Sons, Edinburgh & London.



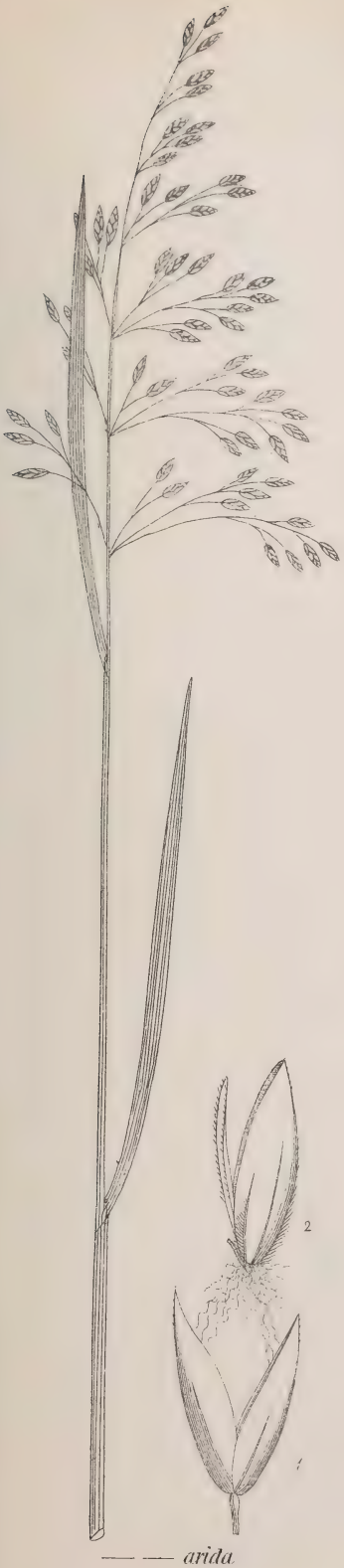
— — *planiculmis*

— — *umbrosa*

R. Parnell M.D. delt. et sculpt.

Printed by J. Gellatly.

Published by Wm. Blackwood & Sons, Edinburgh & London.



— — *arida*

— — *retroflexa*

rnell M.D delt et sculpt

Printed by J.Gellatly.

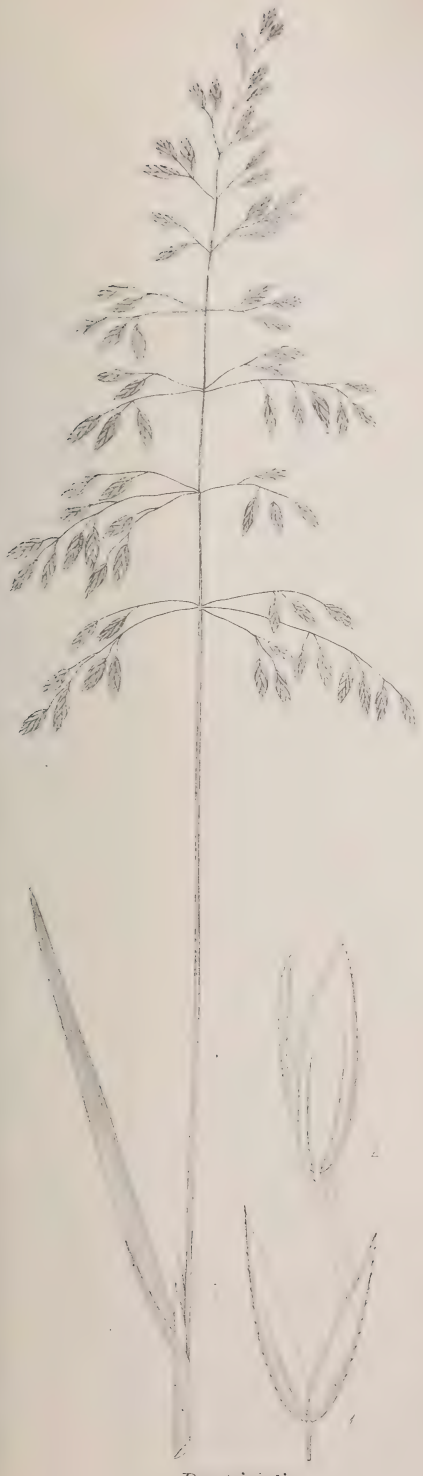
Published by Wm Blackwood & Sons, Edinburgh & London.

— — *muralis*

— — *arenaria*

Printed by J.Gellatly.

Published by Wm Blackwood & Sons, Edinburgh & London.



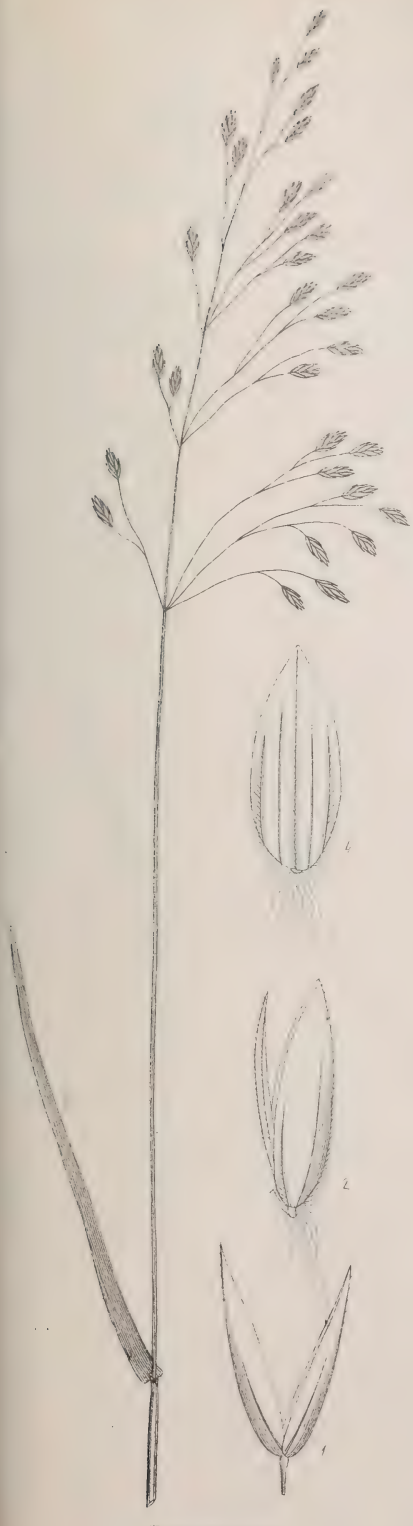
Poa trivialis

— — parviflora

R. Parnell, M.D. delt et sculpt.

Printed by J. Gellatly.

Published by Wm Blackwood & Sons, Edinburgh & London.



Poa nemoralis

——— *angustifolia*

Parnell M.D. delt et sculpt.

Printed by J.Gellatly.

Published by Wm Blackwood & Sons, Edinburgh & London.

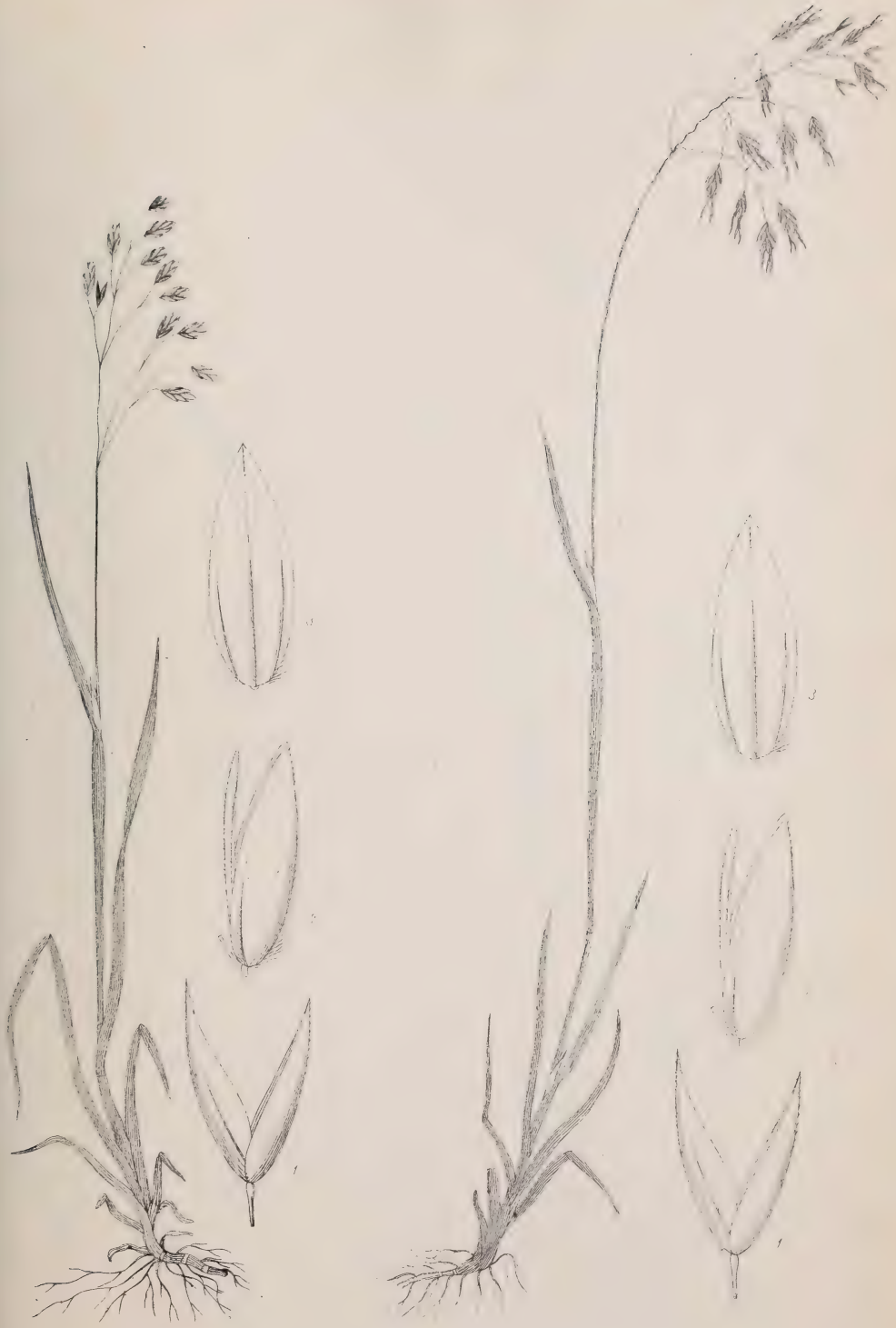
Poa compressa

Poa alpina

R. Parnell W. D. delt et sculp.

Printed by J. Gellatly.

Published by Wm Blackwood & Sons Edinburgh & London.



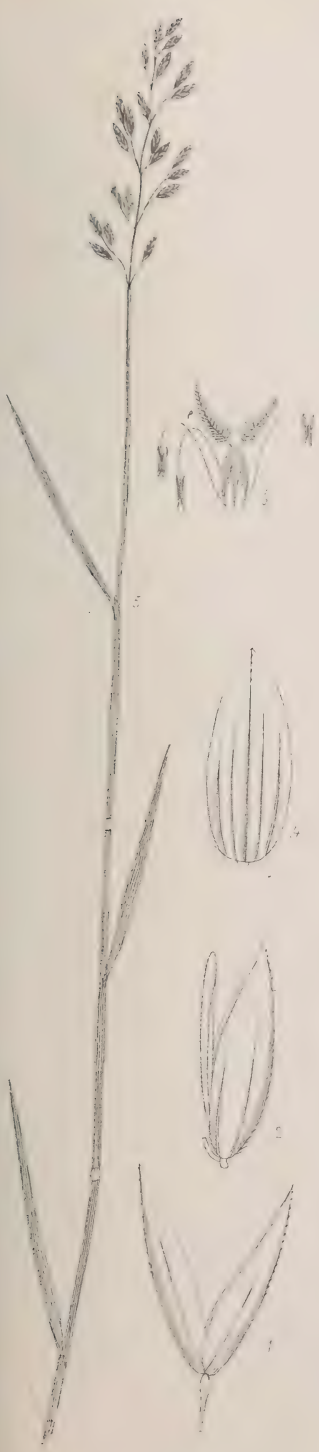
Poa laxa

—— —— *flexuosa*

R. Parnell M.D. delt et sculpt.

Printed by J.Gellatly.

Published by Wm Blackwood & Sons, Edinburgh & London.



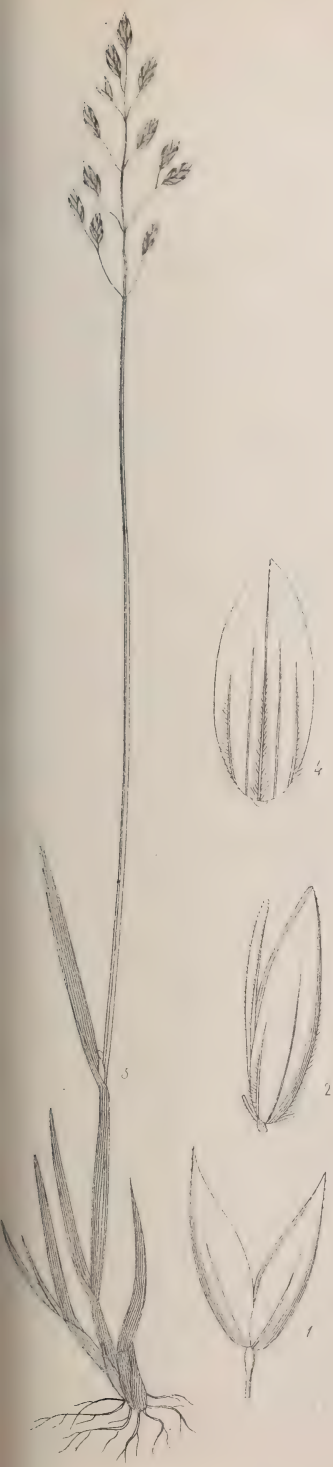
Poa polynoda

Poa montana

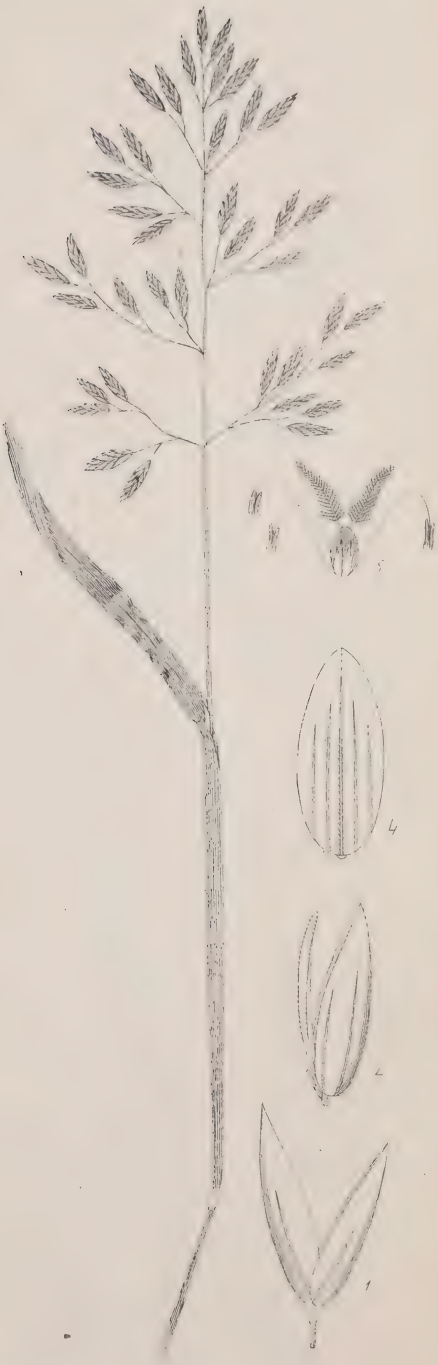
rnell M.D. delt et sculpt

Printed by J.Gellatly.

Published by Wm Blackwood & Sons, Edinburgh & London.



Poa cæcia

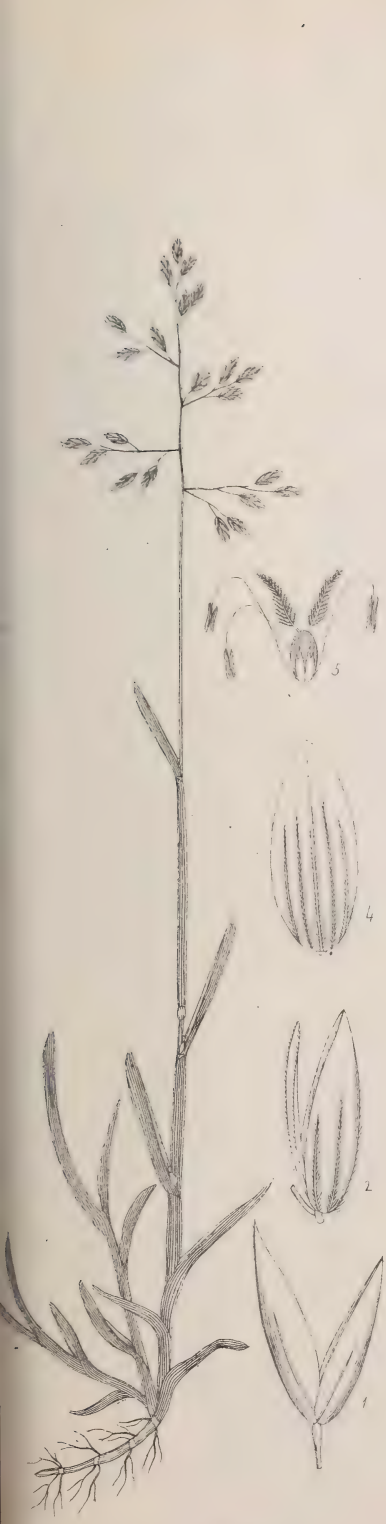


Poa annua

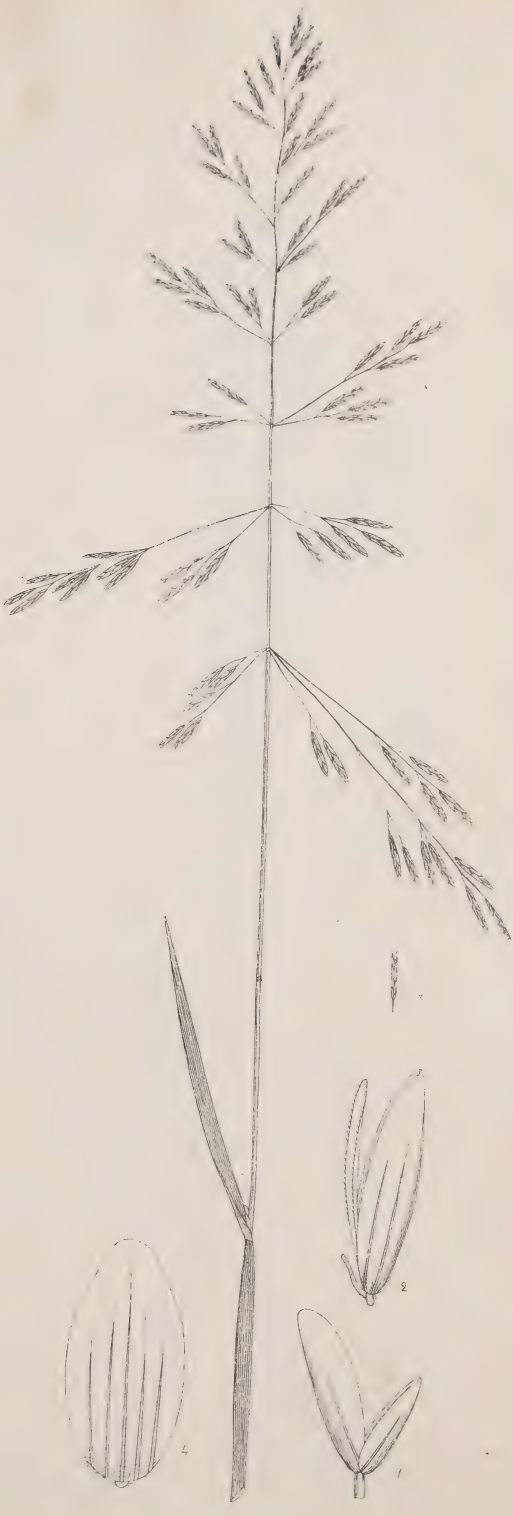
Parnell M.D. delt et sculpt.

Printed by J.Gellatly.

Published by Wm Blackwood & Sons, Edinburgh & London.



— — *serica*

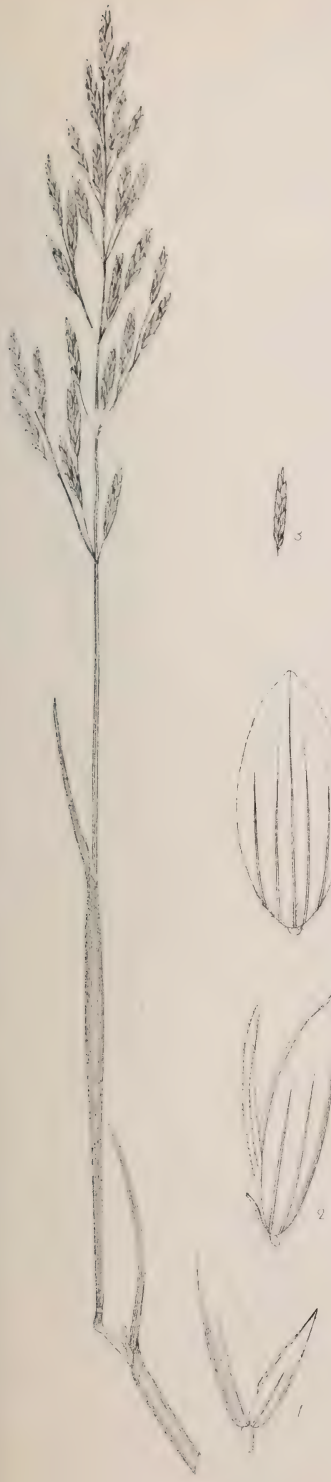


Poa distans

M.D. delt et sculpt

Printed by J.Gellatly.

Published by Wm Blackwood & Sons, Edinburgh & London.



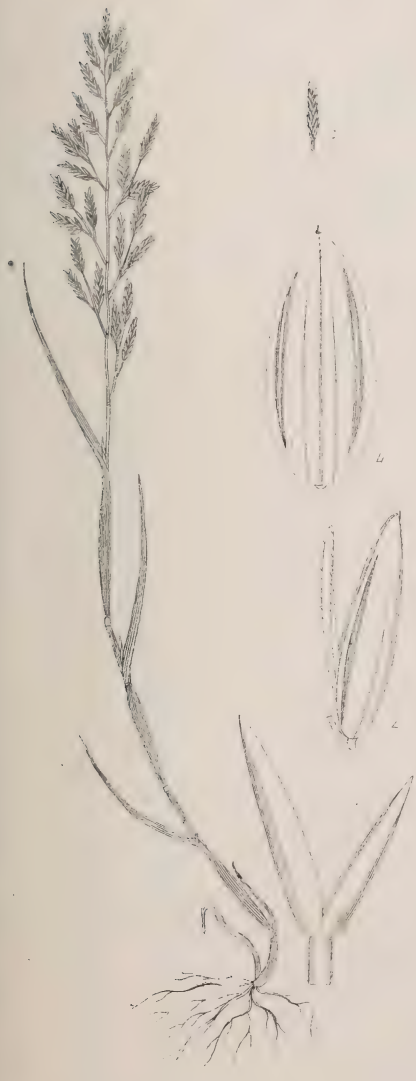
Poa maritima

Poa procumbens

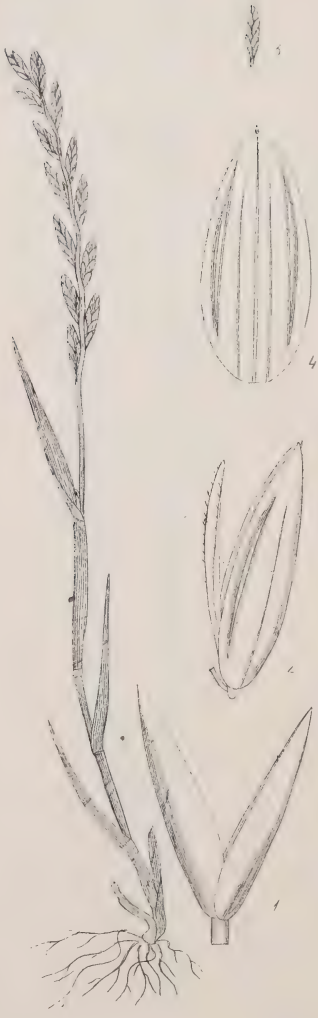
Farnell M.D. delt et sculp.

Printed by J.Gellatly.

Published by Wm. Blackwood & Sons, Edinburgh & London.



Poa rigida

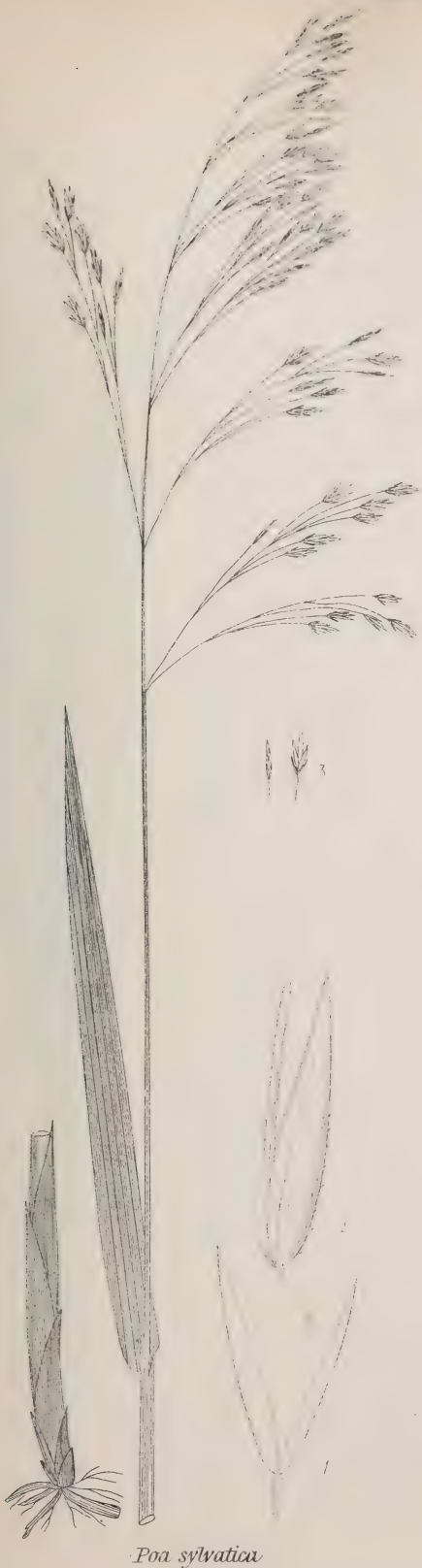


Poa loliacea

R. Parnell M.D. delt et sculpt

Printed by J.Gellatly.

Published by Wm Blackwood & Sons, Edinburgh & London.



Poa sylvatica

Poa aquatica

R. Parnell M.D. delt et sculpt

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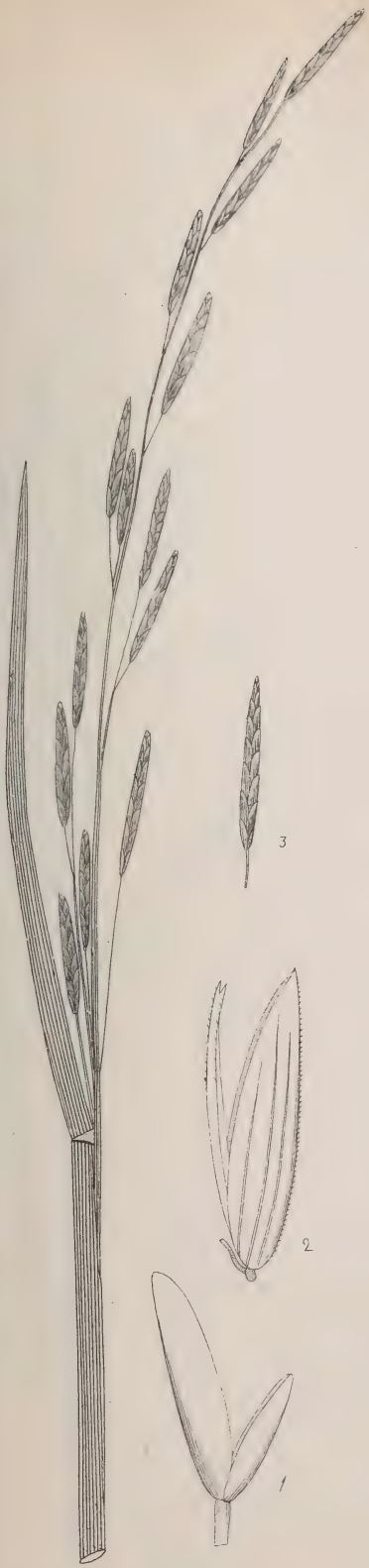


Poa fluitans

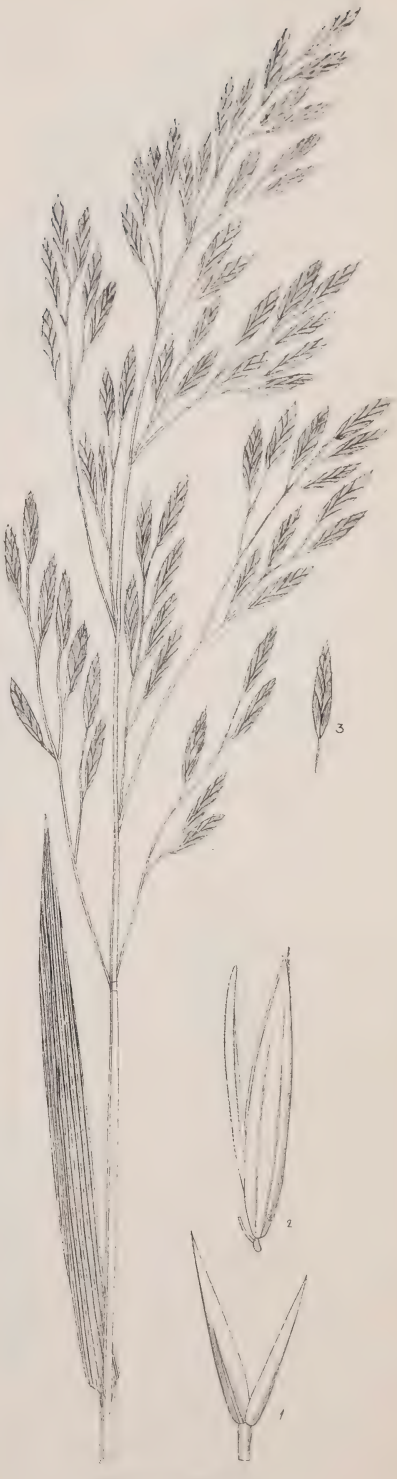
Bucetum loliaceum

R. Parnell M.D. delt et sculpt

Printed by J.Gellatly.

Published by Wm Blackwood & Sons, Edinburgh & London.

Bucetum pratense

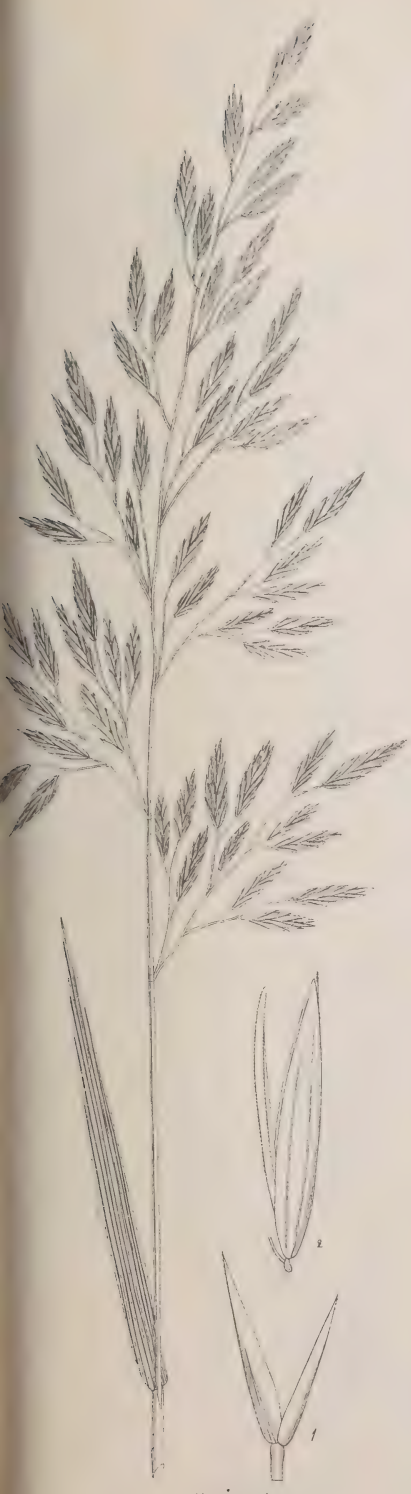


Bucetum elatius

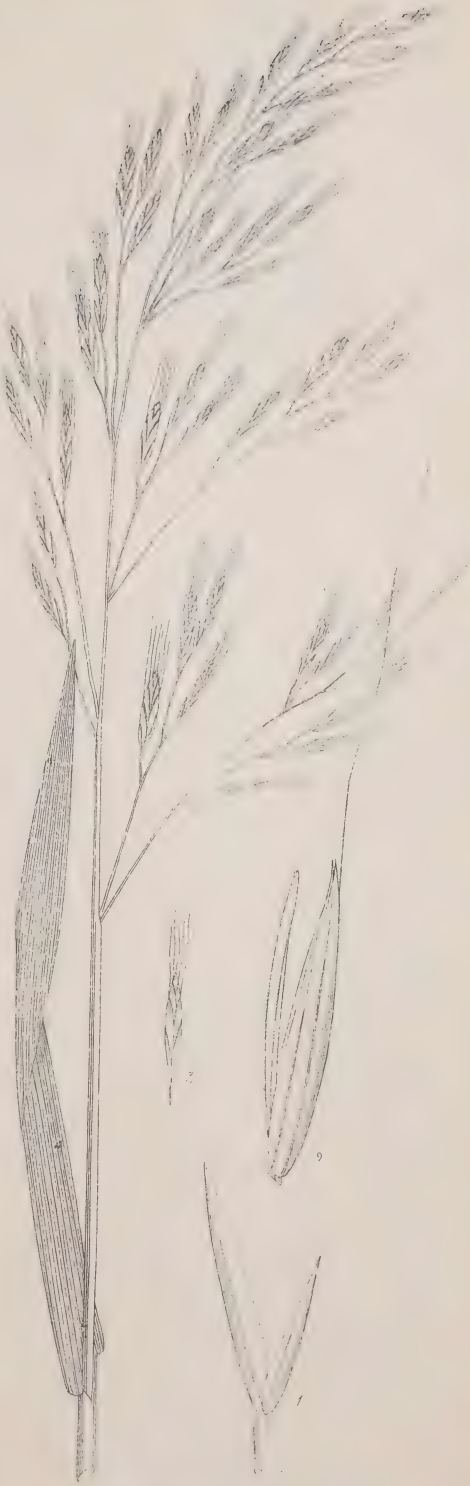
R. Parnell. M.D. delt et sculpt.

Printed by J.Gellatly.

Published by Wm Blackwood & Sons, Edinburgh & London.



— — *variegatum*



Bromus giganteum

W. Parnell M.D. delt et sculpt

Printed by J. Gellatly.

Published by Wm Blackwood & Sons, Edinburgh & London.

Bromus mollis

Bromus racemosus

R. Parnell, M.D. del. et sculp.

Printed by J.G. Lally.

Published by Wm Blackwood & Sons, Edinburgh & London.

Bromus secalinus

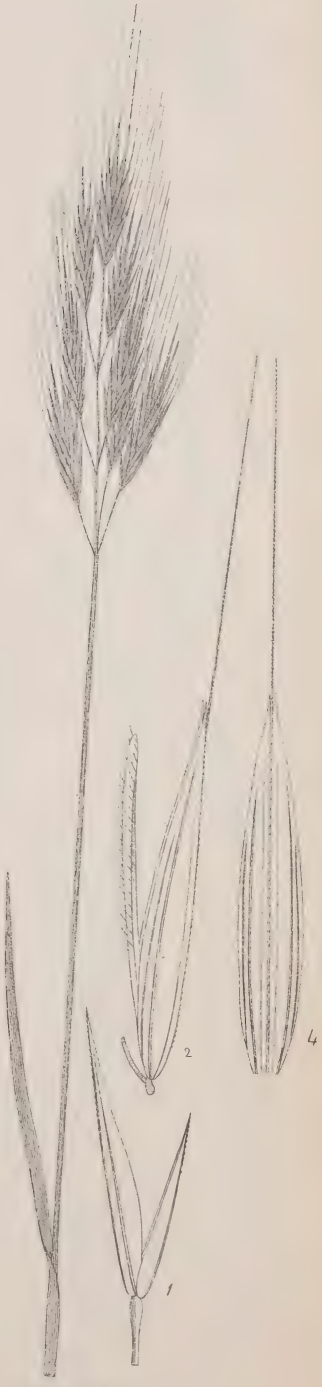
Bromus arvensis

R. Parnell M.D. delt. et sculpt.

Printed by J.Gellatly.

Published by Wm Blackwood & Sons, Edinburgh & London.

Bromus sterilis



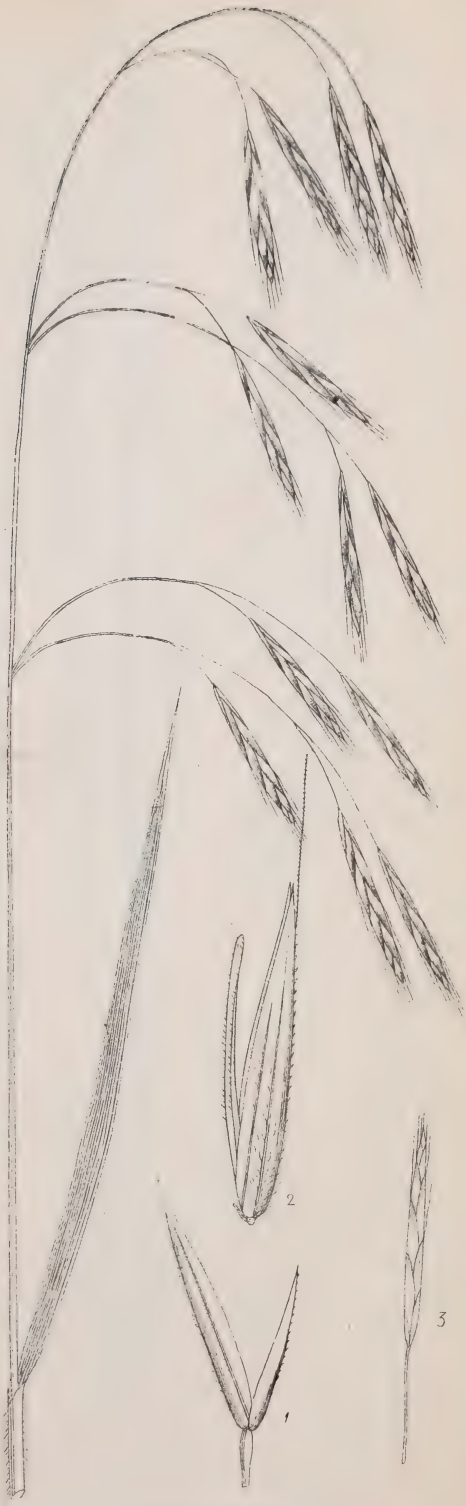
Bromus diandrus

R. Parnell M.D. delt et sculpt.

Printed by J. Gellatly.

Published by Wm. Blackwood & Sons, Edinburgh & London.

Bromus erectus



Bromus asper

R. Parnell M.D. delt. et sculpt.

Printed by J.Gellatly.

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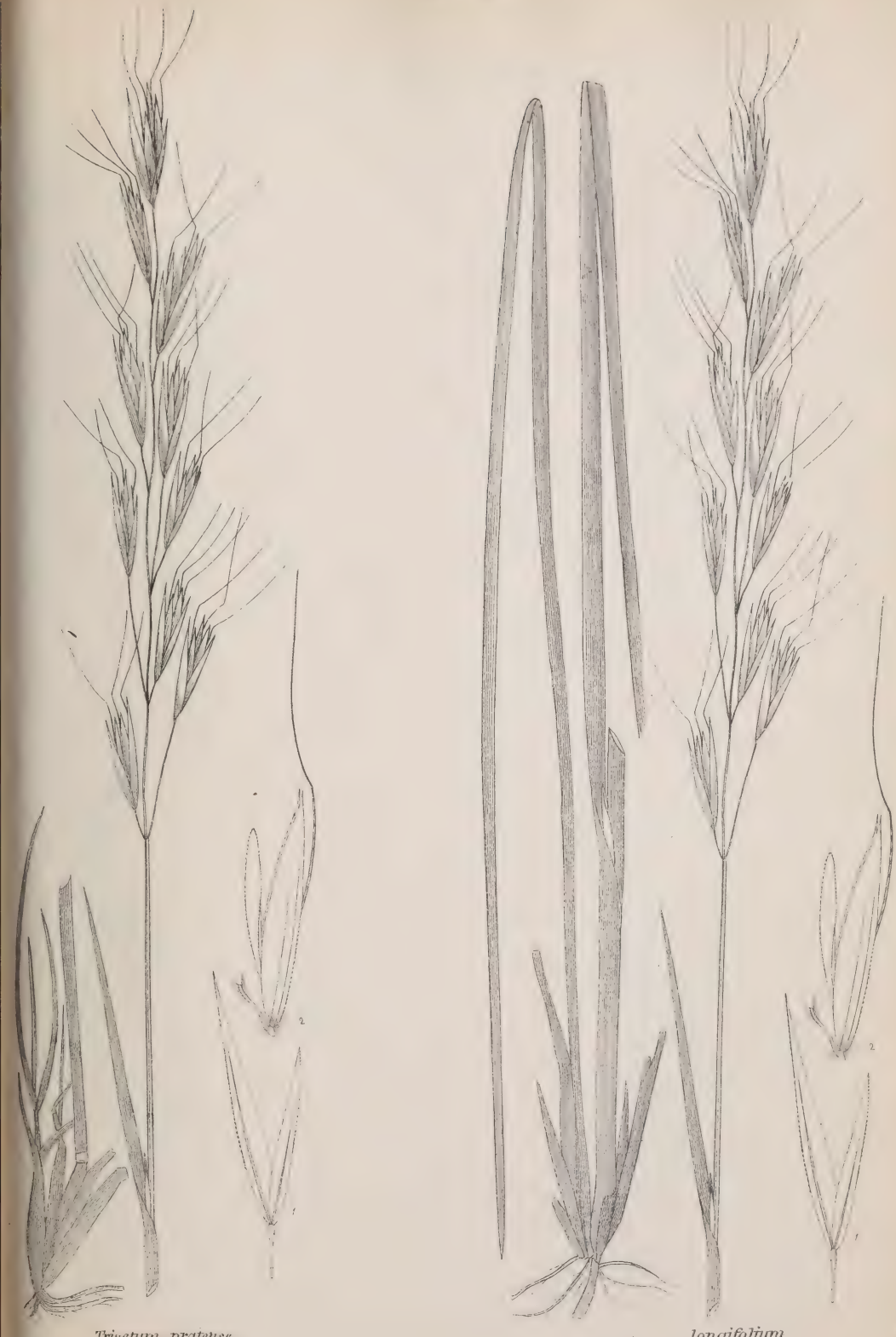


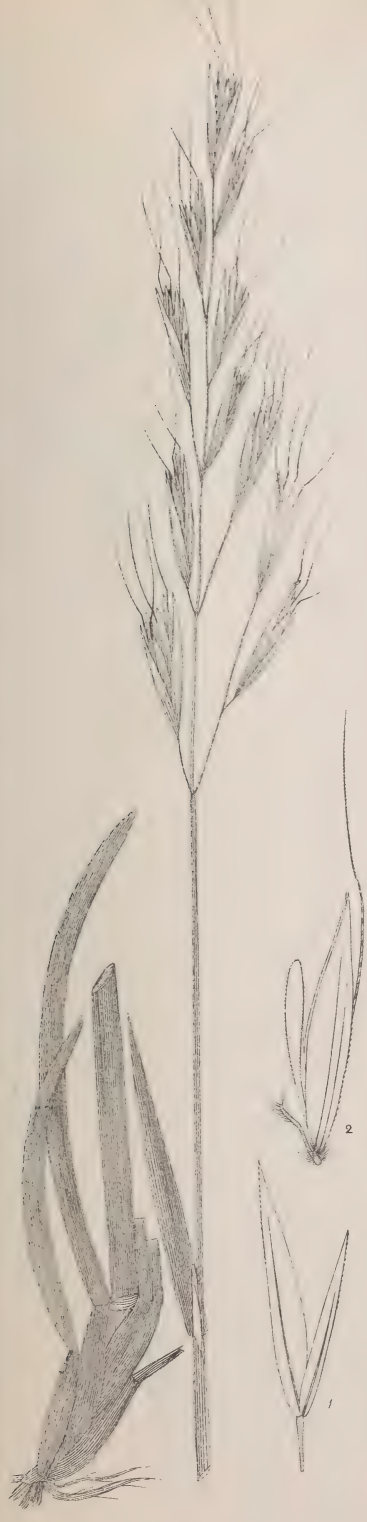
Trisetum pratense

——— *longifolium*

R. Parnell. M.D. delt. et sculp.

Printed by J.Gellatly.

Published by Wm. Blackwood & Sons, Edinburgh & London.



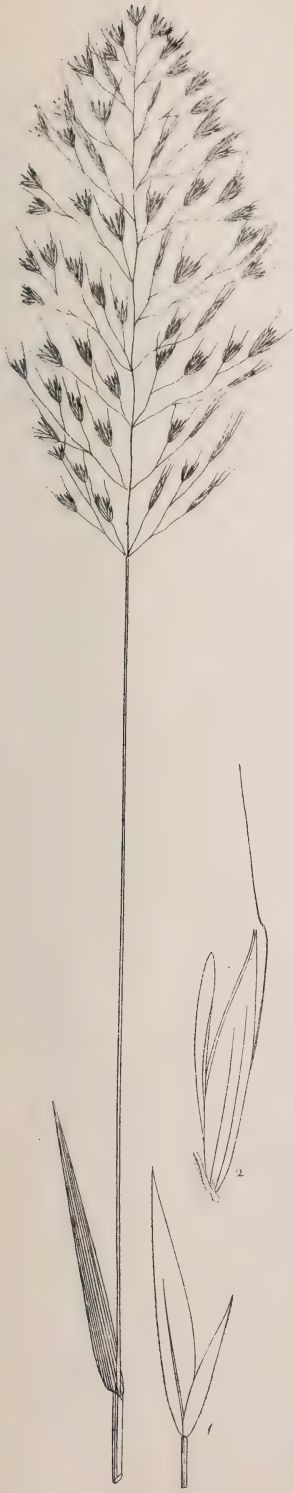
—— —— latifolium

Trisetum pubescens

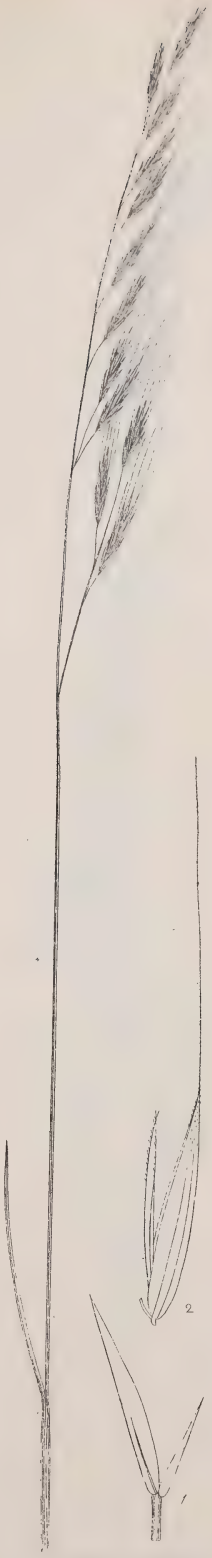
R. Parnell M.D. delt. et sculp.

Printed by J. Gellatly.

Published by Wm Blackwood & Sons, Edinburgh & London.



Trisetum flavescens



Festuca bromoides

R. Parnell M.D. delt et sculpt

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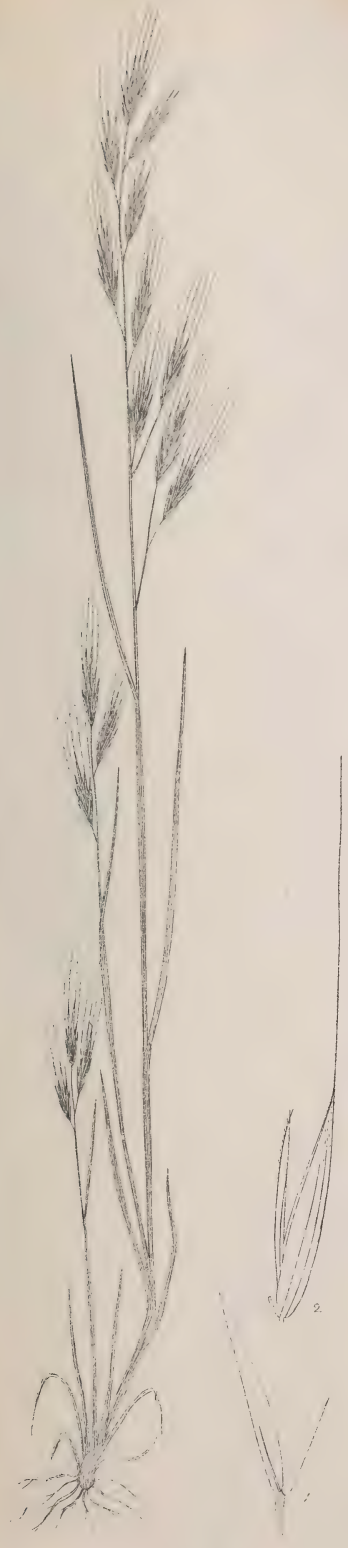

nana

Festuca myurus

R. Parnell M.D. delt et sculpt.

Printed by J.Gellatly.

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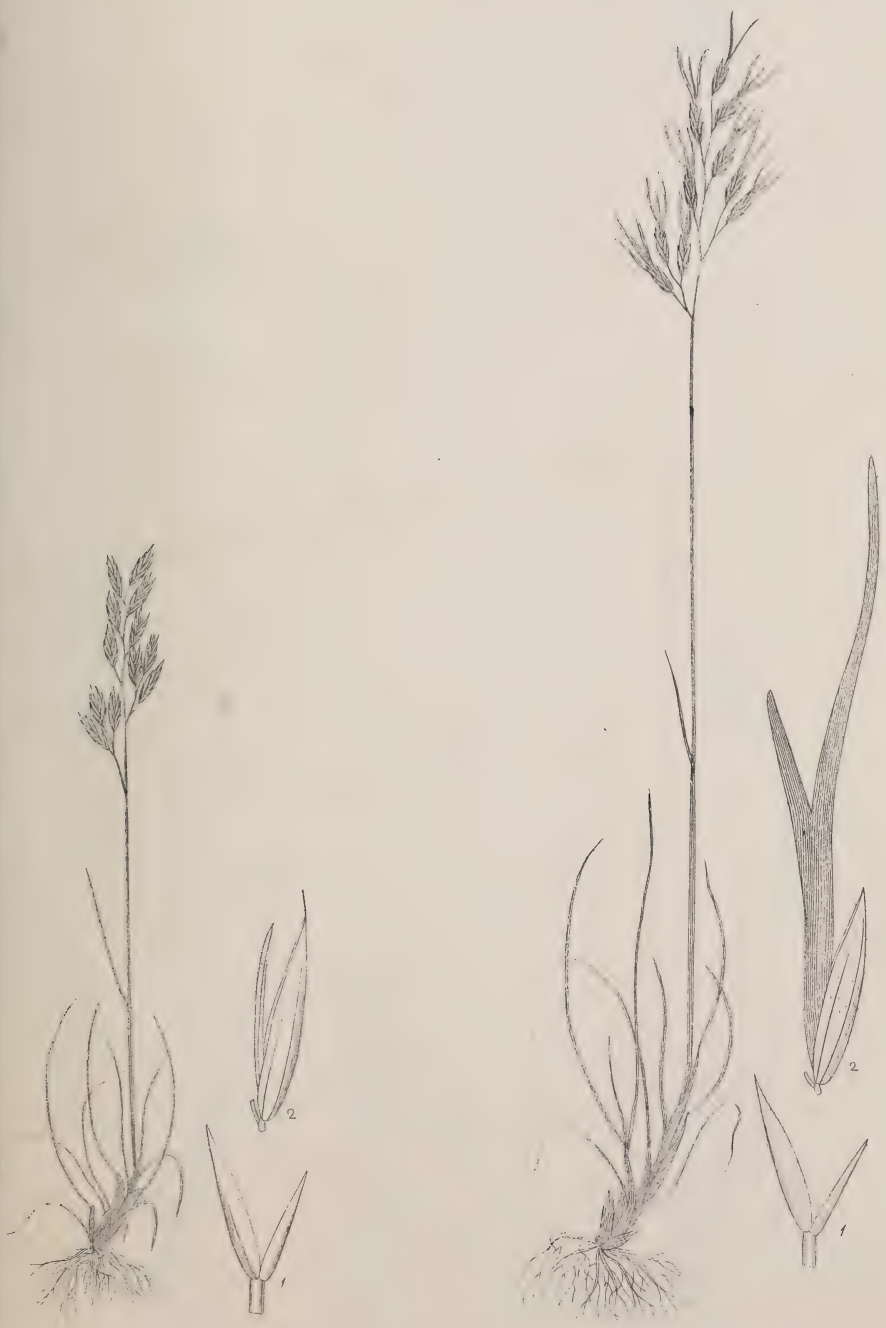

Festuca ovina

—— *vivipera*

R. Darnell M.D. delt. et sculpt.

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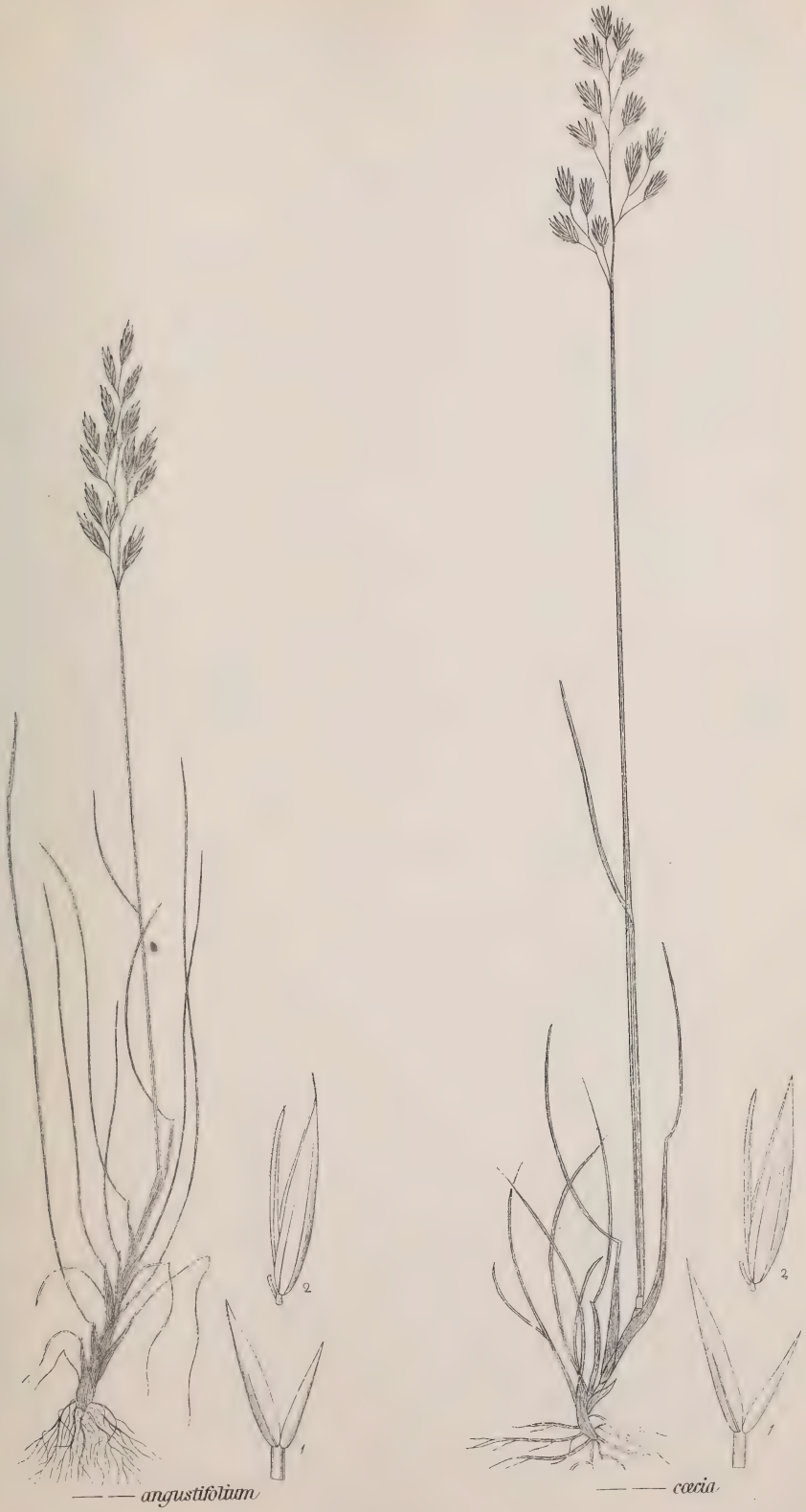


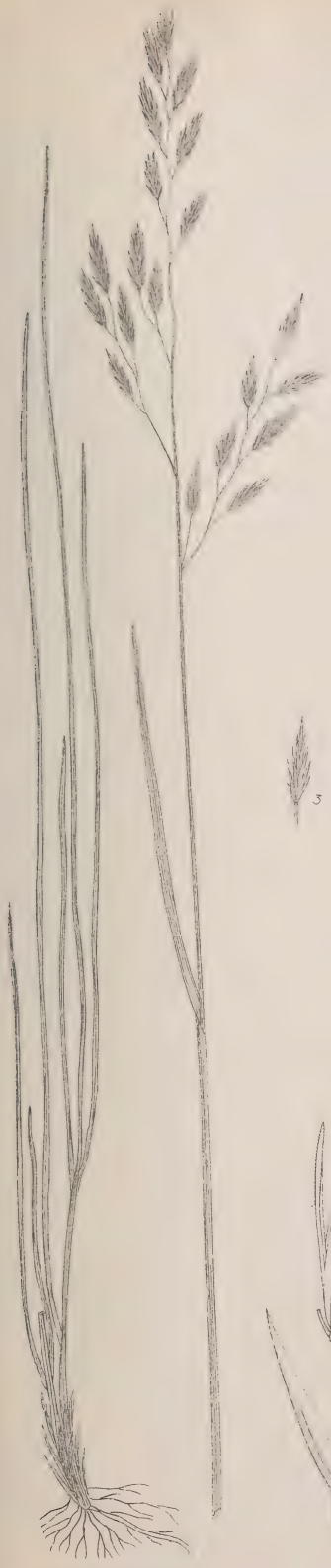
—— —— *angustifolium*

—— —— *cœcia*

R. Parnell M.D. delt et sculpt.

Printed by J.Gellatly.

Published by Wm Blackwood & Sons, Edinburgh & London.



Festuca duriuscula

- hirsuta

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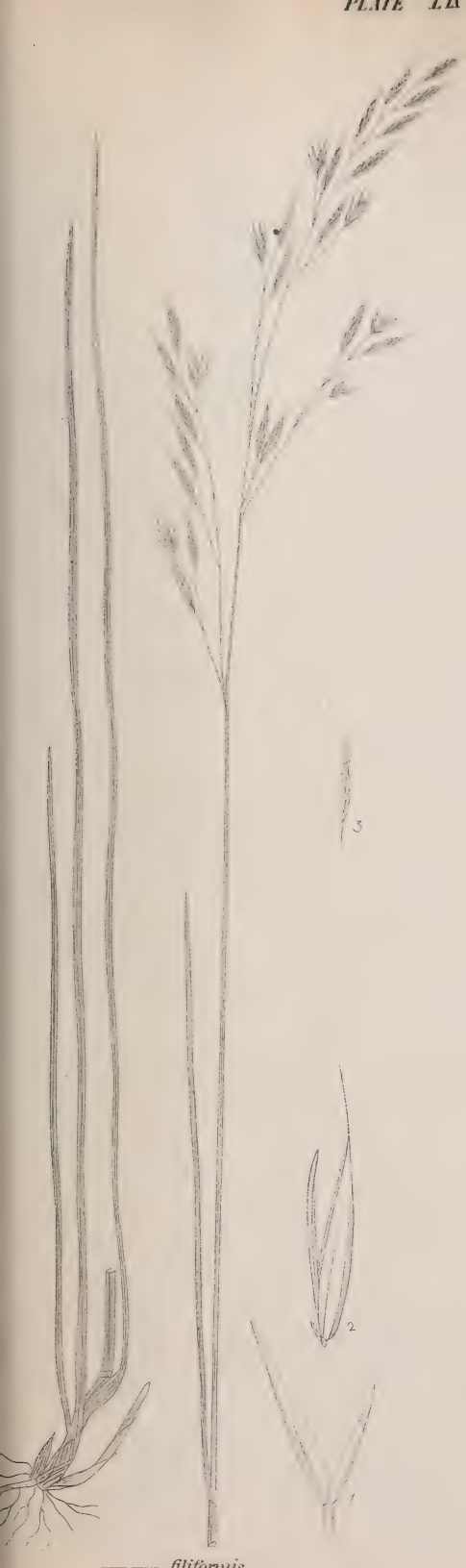

—— —— *filiformis*

—— —— *arenaria*

R. Parnell M.D. del^t et sculp^t.

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— — *humilis*

— — *rubra*

R. Parnell M.D. delt et sculpt.

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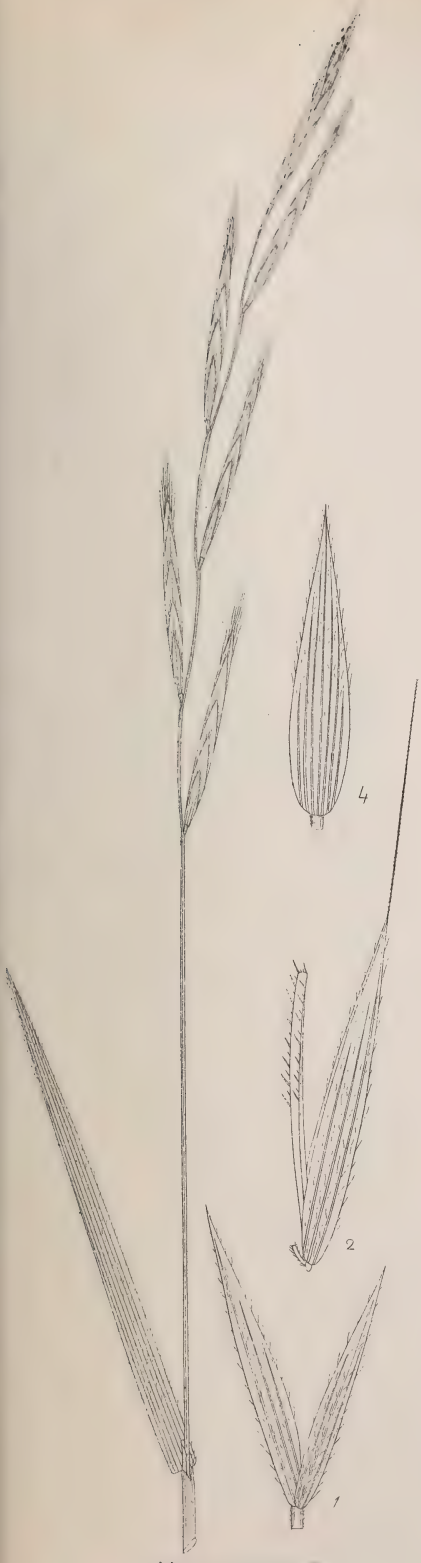

Triticum sylvaticum.

Triticum cristatum

J. Purnell M.D. delt et sculpt.

Printed by J.Gellatly.

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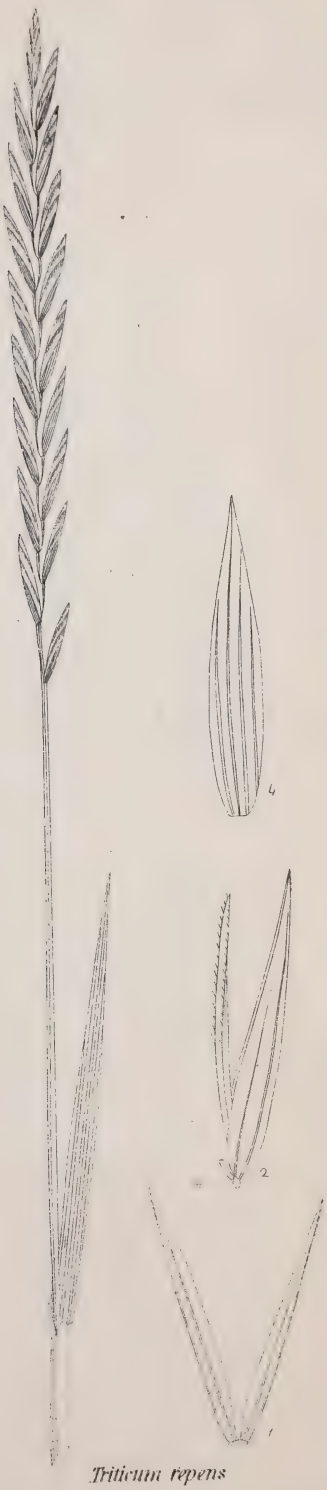
Triticum caninum



Triticum repens

R. Parnell M.D. delt et sculp.

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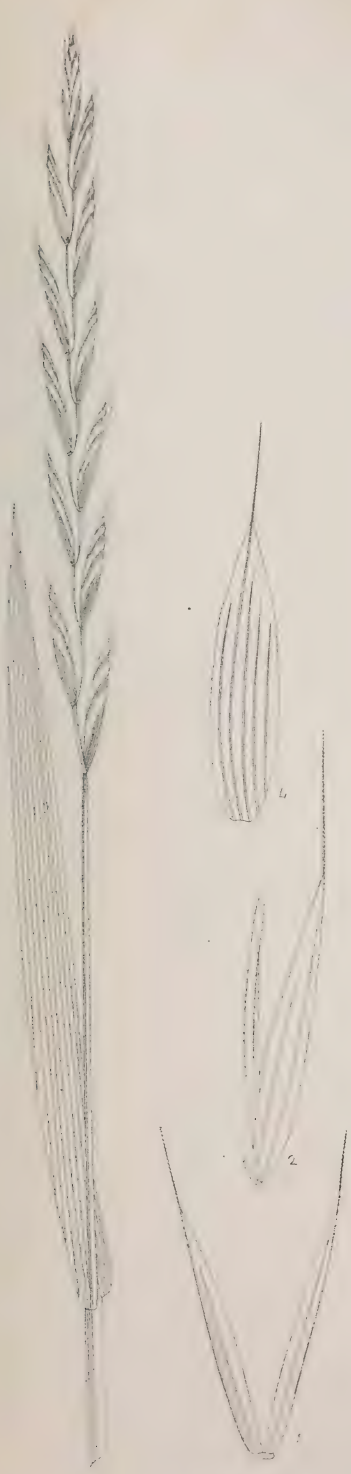
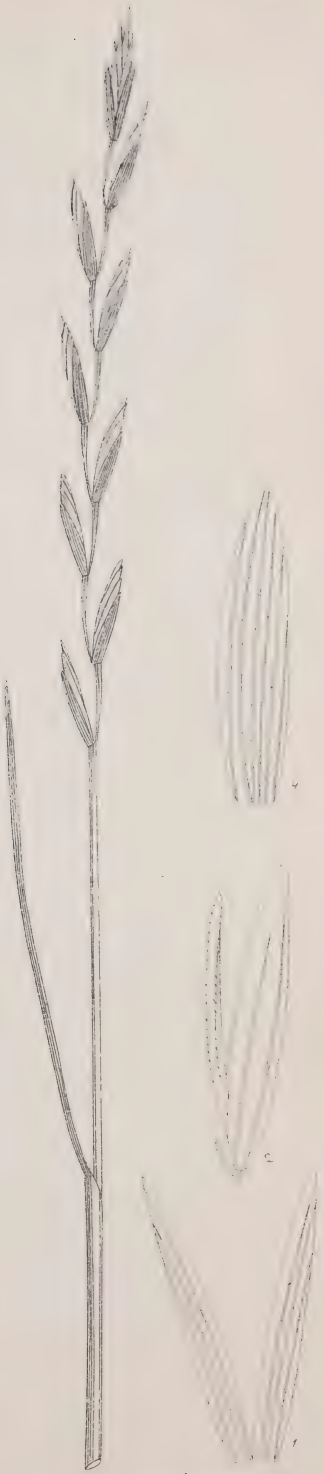


aristatum



Triticum junceum

W. Parnell, M.D. delt. et sculpt.

Printed by M'Gellatly.

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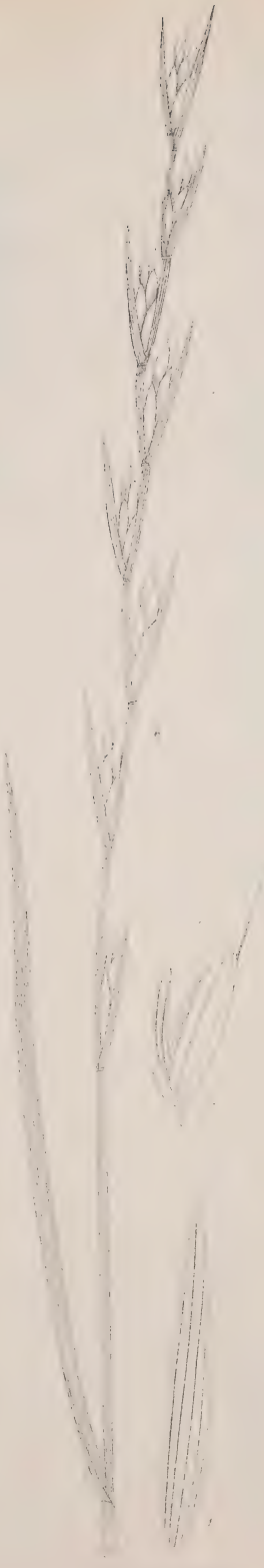
Elymus arenarius



Lolium temulentum

R. Parnell M.D. del^t et sculp^t

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Lolium perenne

—— racemosum

—— italicum

J. Parnell M.D. delt et sculp.

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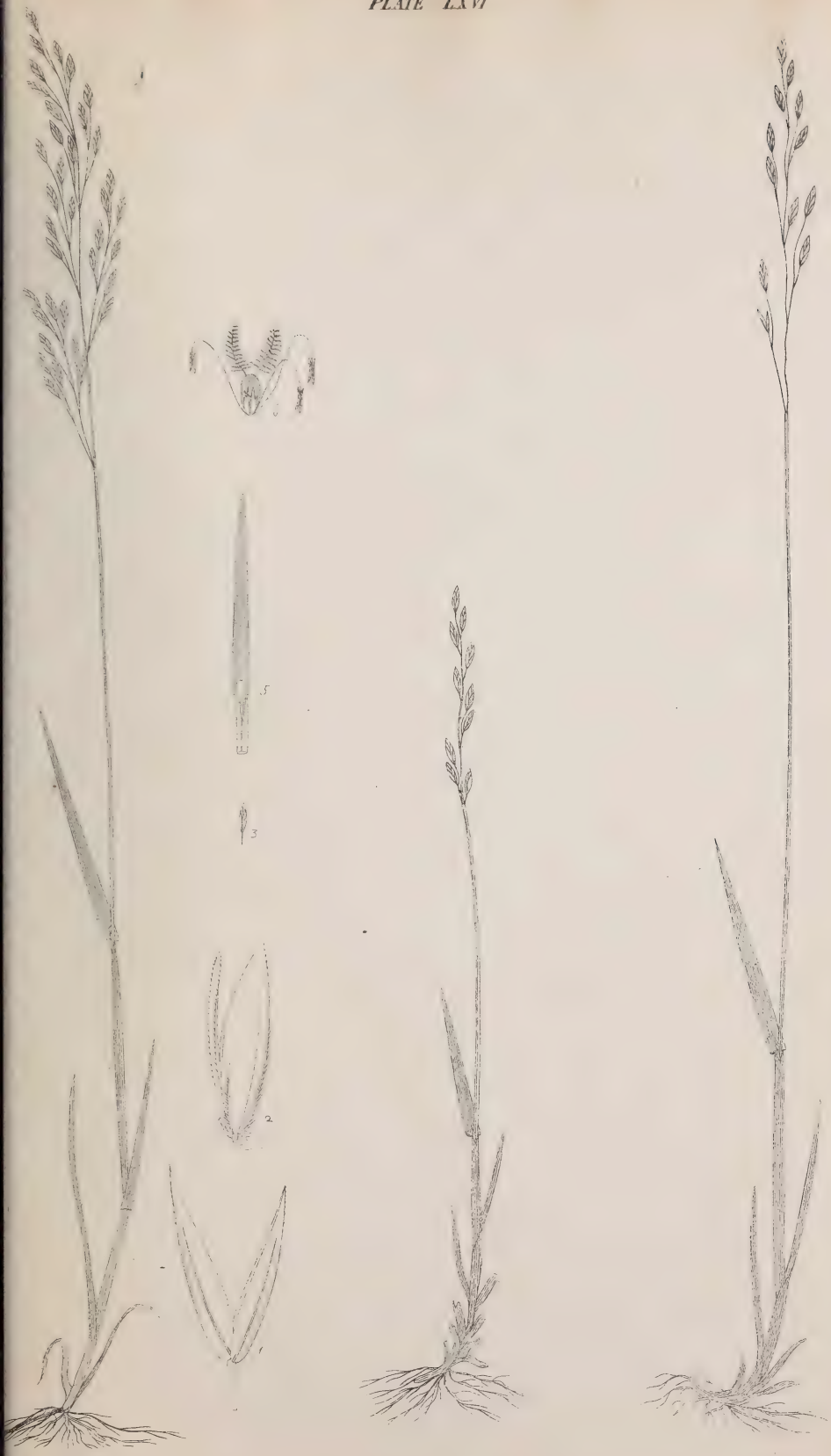

Poa Balfouri

— — *rigida*

— — *extensa*

Parnell M.D. delt et sculpt.

Printed by J.Gellatly.

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